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Comparison among different decommissioning funds methodologies for nuclear installations

Final Report

Country Report Finland

on behalf of the European Commission
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Final Country Report (WP 1/WP 3)

Finland

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Summary

The major generators of radioactive waste in Finland are the two nuclear power plants, the Loviisa and Olkiluoto plants. The Loviisa plant has two VVER units, operated by Fortum Power and Heat Oy, and the Olkiluoto plant two BWR units, operated by Teollisuuden Voima Oy. These power plant units were connected to the electrical network between 1977 and 1980. The construction of a new PWR unit started in 2005 in Olkiluoto. It is scheduled to be operational in 2009.

Both operating nuclear power plants have interim storages for spent fuel as well as facilities for the management of low and intermediate level waste. The facility for final disposal of low and intermediate level radioactive wastes was taken into operation at Olkiluoto in 1992 and the facility for disposal of low level waste at Loviisa in 1998. Disposal of spent nuclear fuel is under preparation and has passed the first authorization step, so called Government's Decision-in-Principle, which was endorsed by the Parliament in 2001. The construction of an underground rock characterisation facility started in 2004. No decommissioning projects of nuclear facilities are underway. However, the utilities are obliged to update the decommissioning plans of NPPs for regulatory review every five years. The latest updates of the technical plans and the cost estimates were carried out in 2003. The decommissioning plan of the research reactor FiR 1 is also updated every five year, the latest update was carried out in 2005.

The financial provisions for all nuclear waste management, including dismantling, decontamination and demolition of nuclear facilities, in Finland have been arranged through the State Nuclear Waste Management Fund, which was founded in 1988. A producer of nuclear waste is fully responsible for its nuclear waste management and decommissioning of its nuclear facility. The main objectives of the system, created through the legislation, are: (a) at any time there shall be sufficient funds available to take care of the decommissioning and the nuclear waste management and disposal measures caused by the waste produced up to that time; and (b) the financial burden caused by the production of wastes shall, in a timely manner, be reflected in the cost of electricity produced through the activity giving rise to those wastes. The part of liability that is not covered by money in the Fund must always be fully guaranteed. The State Nuclear Waste Management Fund is a special purpose fund, segregated from the State budget. The licence holders are entitled to borrow back 75% of the capital of the Fund against the provision of full guarantees and at current interest rates. In addition, the State has the right to borrow the rest of the capital. Plans and cost estimates for the remaining nuclear waste management measures are updated yearly by the nuclear power companies and the operator of the research reactor and approved by the authorities. The assessed liability and fees to be paid into the Fund by the companies are then confirmed. No discounting is used. The funding system in Finland seems to work well and so far no serious problems have arisen as regards the future availability of sufficient capital for the dismantling, decontamination and demolition of nuclear power plants and for the management and disposal of all types of nuclear wastes.

1 Introduction and overview

1.1 General policy with regard to the future of nuclear energy and to decommissioning

Nuclear energy has played a major role in the Finnish electricity production since the beginning of the 1980s. The total capacity of the four reactor units, situated at two different sites, is presently 2 696 megawatts. Teollisuuden Voima Oy (TVO) operates the Olkiluoto power plant with two 860 MW(e) BWR units supplied by Asea-Atom and commissioned in 1979 and 1982. TVO is a company under private law. Its shares are hold by Finnish industrial and power companies who use or distribute the electricity generated in TVO's plants. Fortum Power and Heat Oy (FPH), a subsidiary company, fully owned by Fortum Oyj, a quoted company under private law, with the majority (51.5%) of shares owned by the Finnish state, operates two 488 MW(e) Russian type VVER units commissioned in 1977 and 1981 at the Loviisa site. In addition, there is one small research reactor FiR 1 in Espoo operated by VTT Technical Research Centre of Finland. The construction licence for building the fifth reactor to Finland, Olkiluoto 3, which will be operated by TVO as well, was granted by the Government in early 2005. The present proportion of nuclear electricity is about one quarter of the total electricity consumption.

According to the Nuclear Energy Act, a licensee, whose operations generate or have generated nuclear waste, shall be responsible for all measures related to decommissioning[1] (including spent fuel and other nuclear waste management and disposal as well as dismantling/decontamination/demolition of nuclear facilities and the management and disposal of all arising nuclear wastes) and their appropriate preparation, and is responsible for all the arising expenses. According to the Section 20 of the Nuclear Energy Act one of the conditions to grant a licence to operate a nuclear facility is that "the methods available to the applicant for arranging nuclear waste management, including final disposal of nuclear waste and decommissioning of the facility, are sufficient and appropriate". In case of the research reactor, the operator is in a similar way fully responsible for spent nuclear fuel and waste management and disposal as well as for decommissioning of the facility. The State has deposited main part of the necessary funds to the State Nuclear Waste Management Fund on behalf of the operator of the research reactor.

[1] In the terminology of the Finnish Nuclear Energy Act and Decree *Nuclear Waste Management* is understood in broad sense to include the decommissioning of nuclear facilities, intermediate storage of spent fuel and other wastes as well as the disposal of all types of nuclear wastes. In the terminology employed in this project *Decommissioning* is defined to include dismantling/decontamination/ demolition and waste management and disposal and other stages, such as transportation, belonging to the back-end operations of the nuclear fuel cycle.

The NPP utilities FPH and TVO themselves take care of interim storage of spent fuel, of management of LILW including disposal, and of planning and later implementation of the decommissioning of the NPPs. Their jointly owned (TVO 60%, Fortum 40%) company, Posiva Oy, is taking care of the preparations for and later implementation of spent fuel encapsulation and disposal.

1.2 Legal base for (financing of) decommissioning in Finland

In 1987, a completely revised Nuclear Energy Act came into force and a supporting Nuclear Energy Decree in 1988. The scope of this legislation covers e.g.

- the construction, operation and decommissioning of nuclear facilities; nuclear facilities refer to facilities for producing nuclear energy, including research reactors, facilities performing extensive disposal of nuclear waste, and facilities used for extensive manufacture, production, use, handling or storage of nuclear materials or nuclear wastes,
- mining and enrichment operations aimed at producing uranium or thorium,
- the possession, manufacture, production, transfer, handling, use, storage, transport, export and import of nuclear material and nuclear waste as well as the export and import of ores and ore concentrates containing uranium or thorium.

A significant amendment to the Nuclear Energy Act was passed in 1994, to reflect a new policy that emphasises the national responsibility to manage nuclear waste generated in Finland. In general, the export and import of nuclear waste, including spent fuel, is prohibited in the revised Act. Sections 28–34 of the Nuclear Energy Act set forth the requirements on nuclear waste management *(covering all stages included in decommissioning according to the definition of this project)* and Sections 35–53 for the financial provisions for these activities. These provisions address also spent fuel management. Some additional detailed guidance is given in the Decision of the Council of State concerning the Providing for Nuclear Waste Management Costs.

Besides the management and disposal of all types of nuclear wastes the *Licensees under a waste management obligation* (power companies and the operator of the research reactor) are responsible also for the planning and implementation of all the technical stages (dismantling, decontamination, demolition, waste management and disposal) comprised in decommissioning of nuclear facilities.

According to Section 29 of the Nuclear Energy Act, the Ministry of Trade and Industry may order various licensees under the waste management obligation to undertake decommissioning and waste management and disposal measures jointly, if by doing so safety can be increased or costs can be substantially reduced or if any other weighty reason so requires. At the same time, provisions shall be laid down, if necessary, on the distribution of the costs incurred due to the measures to be carried out jointly.

The state has the secondary responsibility in case that a producer of nuclear waste (Nuclear Energy Act, Sections 31 and 32) is incapable of fulfilling its management obligation.

The Radiation Act (592/1991) and Decree (1512/1991) define the radiation protection requirements for the management of non-nuclear radioactive wastes. The responsible party (i.e. the licensee or any company or organization which uses radiation sources in its practices) is required to take all measures needed to render radioactive waste arising from its operation harmless. In case where the practice produce or may produce radioactive waste that can not be rendered harmless without considerable expenses, a financial security shall be furnished to ensure that these costs and those arising in performing any necessary environmental decontamination measures are met.

1.3 Nuclear installations Finland and their stage of operation/decommissioning

In Finland, two NPPs, with a total capacity of 2 696 MW_e(net), are currently in operation. The Loviisa plant includes two 488 MW_e (net) VVER units, operated by Fortum Power and Heat Oy (FPH) and the Olkiluoto plant two 860 MW_e (net) BWR units, operated by Teollisuuden Voima Oy (TVO). The construction licence for a new PWR unit, Olkiluoto 3 of about 1600 MW_e, was granted by the Government in February 2005. The Section 32 of the Nuclear Energy Decree requires that the application for a construction licence shall be supplemented among others by a description of the applicant's plans and available methods for arranging nuclear waste management, including the decommissioning of the nuclear facility and the disposal of nuclear waste, and a description of the timetable of nuclear waste management and its estimated costs. The granting of the operation licence requires that more detailed descriptions are given for waste management and disposal as well as for decommissioning. Furthermore according to Nuclear Energy Act (Section 44) the licensee under a waste management obligation shall supply the State with securities (to cover the financial liability for the decommissioning and waste management and disposal) prior to the commencement of the waste generating operation.

A research reactor FiR 1 (TRIGA Mark II, 250 kW) is situated in Espoo and operated by the VTT Technical Research Centre of Finland. It was taken into operation in 1962. VTT has also radiochemical laboratories and a hot-cell for testing radioactive materials.

Both NPPs have storage facilities for fresh and spent fuel and facilities for treatment and storage of low and intermediate level radioactive waste (LILW). The disposal facility for LILW was commissioned at the Olkiluoto site in 1992 and for LLW at the Loviisa site in 1998. The disposal plans for the wastes arising from the decommissioning of nuclear power plants are based on the extension of the on-site LILW repositories. Activated metal components accumulated during the operation of the reactors would also be disposed of in those repositories. Preliminary studies have already been made on the feasibility of disposing the decommissioning wastes of the research reactor FiR 1 in the disposal facility at the Loviisa NPP site.

All spent fuel generated at the Olkiluoto plant is stored on-site. Previously the spent fuel of the Loviisa plant was transported to the Mayak facilities in the Russian Federation, after interim storage of a few years. An amendment to the Nuclear Energy Act was passed in 1994 stating that spent fuel generated in Finland has to be treated, stored and disposed of in Finland. Spent fuel shipments to the Russia were terminated at the end of 1996, and since then the spent fuel generated at the Loviisa plant has been stored at the plant. In 1995, a joint waste management company Posiva Oy was established by FPH and TVO for taking care of the disposal of spent fuel. Spent nuclear fuel from NPPs is stored at the power plant sites until it will be disposed of.

Initially, the spent fuel is cooled for a few years at reactor pools. In addition to the pools in the reactor buildings, the Loviisa NPP has basket type and rack type pool storages attached to the reactor building. The effective storage capacity (excluding reserves for repair work) is about 520 tU. The most recent enlargement of the pool facility was commissioned in 2001. The current capacity is adequate until about 2010. The needed additional capacity is planned to be achieved by providing pools with dense racks.

At the Olkiluoto plant, the effective capacity (excluding reserves for repair work) of the pools at the reactor buildings is about 370 tU. Subsequently, the spent fuel is transferred to an on-site facility with three storage pools, the capacity of each being about 400 tU, with high-capacity fuel racks. The spent fuel storage facility was commissioned in 1987. The current capacity is adequate until early 2010's. The planning for extension of the storage has been started. The construction of Olkiluoto 3 unit will be taken into account in the design of the extension of the storage.

The Finnish spent nuclear fuel cycle policy is based on the once-through option, where the spent fuel is not reprocessed. The spent fuel will be disposed of into the Finnish bedrock after an interim storage period and encapsulation. Posiva is implementing the spent fuel disposal programme with the following main targets, which are in line with the Government Policy Decision of 1983 (OECD/NEA 1984):

- Disposal site selection in 2000 (The Olkiluoto site was proposed by Posiva in the Decision-in-Principle application of 1999; this application was approved by the host municipality in January 2000, the Decision was made by the Government in December 2000 and it was ratified by the Parliament in May 2001.)
- In the context of endorsement of the Decision-in-Principle concerning the fifth reactor in Finland in May 2002 the Finnish Parliament also endorsed a separate Decision-in Principle on the extension of the Olkiluoto disposal facility to cover the spent fuel from the new unit.
- The construction of an underground rock characterisation facility in Olkiluoto was started in July 2004.
- Preparedness for the application of the Construction Licence in 2012.
- Disposal facility should be ready for operation in around 2020.

1.4 Most important nuclear installations with regard to decommissioning and waste management and disposal costs discussed in this report

Table 1 includes a complete list of nuclear facilities in Finland. In this report one will focus on the facilities required for the management and disposal of spent fuel from existing commercial power reactors and on the technical decommissioning of power reactors and the subsequent management and disposal of the arising decommissioning wastes. In addition, the corresponding technical and funding arrangements for the small research reactor operated by VTT are described briefly in this report. Some special features related to the future application of the national funding system in the case of the new EPR reactor unit, Olkiluoto 3, will be discussed as well.

Table 1 Overview on nuclear installations in Finland (Status: June 2006)

Nuclear facility	Short name	Country	Kind of facility*	Output Power (gross) in MWel (for NPP)	First criticality (in case of reac-tors)	Operational period (commer-cial)	Operating company	Name of quoted companies holding shares in the nuclear facitlity, if any**	Percent-age of shares held*** [%]	De-comm. started in year	De-comm. stage***	Ana-lysed in this report
Loviisa , unit 1	Lo1	FI	NPP, VVER	510 MW	1977	1977-2027	Fortum Power and Heat Oy (FPH)	Fotum Oyj	100%		Operat-ing	X
Loviisa , unit 2	Lo1	FI	NPP, VVER	510 MW	1980	1981-2029						
Disposal facility for operational wastes		FI				1998→						
Olkiluoto, unit 1	OL1	FI	NPP, BWR	890 MW	1978	1979-2039	Teollisuuden Voima Oy (TVO)	Pohjolan Voima Oy	56.8/60.2		Operat-ing	X
Olkiluoto, unit 2	OL2	FI	NPP, BWR	890 MW	1979	1982-2042		Fortum Power and Heat Oy	26.6/25.0			
Disposal facility for operational wastes		FI				1992→		Oy Mankala Ab	8.1			
Interim storage for spent fuel	KPA Store	FI				1987→		Etelä Pohjan-maan Voima Oy	6.5/6.6			
Olkiluoto, unit 3	OL3	FI	NPP, PWR	1 600 MW		2009-2069		Others	2.0/0.1		under constr-uction	X
Triga Mark II research reac-tor	FiR 1	FI	RR	250 kW thermal		1962→	VTT Technical Research Centre of Finland				Oper-ating	X

* Kind of facility: NPP = Nuclear Power Plant RR = Research Reactor
** Quoted: quoted on the stock exchange. Quoted companies directly or indirectly owning the nuclear installation or at least a part of it.
*** Percentage of direct or indirect shares held by companies quoted on the stock exchange.
For the Olkiluoto plant the percentages of shares held are different for OL1&2 / OL3

2 Decommissioning strategies and costs

2.1 Current and past waste management and decommissioning activities

Before the entry into force of the present legislation the old Atomic Energy Act included only very general provisions on decommissioning and nuclear waste management and disposal, since they were not considered significant issues in the 1950s. Fortunately, the Act, however, gave extensive powers to the authorities to draw up licence conditions on arrangements of nuclear waste management, decommissioning included, and on collecting reserves to cover the respective costs and include these conditions in the operating licences of the nuclear facilities. In that connection, it was, however, seen that a stronger legal basis for provision for the costs of decommissioning and nuclear waste management and disposal was needed. This was one of the important reasons to start, at the end of the 1970s, drafting new nuclear legislation. However, due to both substantial disagreements and legislative problems, the new act, Nuclear Energy Act, did not enter into force until in 1988 (Väätäinen & Manninen 2002).

Initially, the nuclear power companies had internal funds for that purpose, but by virtue of entry into force of the Nuclear Energy Act, the State Nuclear Waste Management Fund was established under the Ministry of Trade and Industry (MTI) in 1988. The pertinent Government's Decree (161/2004) on the duties of the Fund has been revised in 2004. The process that led to the selection of the present funding system is described in more detail in section 3.1.

Already before the present legislation was passed, the Government made a major policy decision in 1983 (OECD/NEA 1984) regarding the main objectives and schedule for nuclear waste management and disposal and decommissioning of nuclear power plants. The progress has been in good compliance with this policy decision. Below are given the most important objectives as well as the past, present and near future milestones:

- Extensions of the interim storages were completed in 1987 at the Olkiluoto NPP and in 2000 at the Loviisa NPP. At both sites, there is enough storage capacity until early 2010's.
- The facility for final disposal of low and intermediate level radioactive wastes was taken into operation at Olkiluoto in 1992 and the facility for disposal of LLW at Loviisa in 1998. In Loviisa, the cementation facility for ILW and related disposal cavern are under construction and expected to be operational in 2006 after a pertinent regulatory review.
- The utilities are required to update the plans for the dismantling, decontamination and demolition of NPPs and for the subsequent management and disposal of arising wastes and submit the plans for regulatory review every five years. The latest updates for power reactors were made in 2003. According to the plans, wastes from the decommissioning of the reactors will be disposed

of in underground repositories co-located with those for operational wastes at the power plant sites. Further details on the strategies, technical plans and costs for the decommissioning of the NPPs and the research reactor are given in section 2.2.1.

- The selection of a disposal site for spent fuel disposal was launched by an area screening reported in 1985 and in 1999 Posiva proposed to site the repository at Olkiluoto.
- Technical plans and safety assessments for spent fuel disposal have been regularly updated.
- The Environmental Impact Assessment (EIA) process for spent fuel disposal was initiated in 1997 and completed in 1999.
- The Decision in Principle (DiP) process was started in spring 1999, the Government made the Decision in December 2000 and the Parliament endorsed it in May 2001 (extension for the fifth reactor in May 2002).
- Construction of an underground rock characterization facility started in mid-2004.
- The construction licence process is scheduled to start in 2012 and the operating licence process in 2020.

The funding system implies in general that costs related to already completed waste management stages are no longer included in the funding system. For example, the costs of building the repositories for operational LILW at Olkiluoto and Loviisa were initially included in the individual fund targets (within the State Nuclear Waste Management Fund) of these power companies. After completion of the construction of these disposal facilities the companies were entitled to receive the corresponding reimbursements from the State Nuclear Waste Management Fund.

However, according to the principles of the national funding system, all the future costs of expanding the existing waste management, storage and disposal facilities, costs of future decommissioning of nuclear facilities, the operation of existing repositories and interim storage facilities for spent as well as building of a new repository for spent fuel and expansion of the existing LILW repositories for disposing of the decommissioning wastes are included in the existing funding system (State Nuclear Waste Management Fund) that is going to function in same manner also in the future. As there is no methodological differences in principles between the funding systems applied in the past (after the establishment of the funding system in 1988) and the for the future decommissioning and waste management & disposal activities, a more detailed discussion of the current and expected future strategies of decommissioning and waste management and disposal and the pertinent cost estimates is concentrated in the section 2.2.

2.2 Future waste management and decommissioning strategies

2.2.1 Principal strategies and plans for dismantling and decommissioning of nuclear facilities

The four currently existing Finnish nuclear power reactor units at two sites, Loviisa and Olkiluoto, have been in operation for 25 to 29 years and are planned to be operated for two to three more decades. No nuclear power plants are presently being decommissioned and any such decommissioning projects are neither foreseen in the near future. The current licence of FiR 1 research reactor is valid until the end of 2011. Nevertheless, the operator of FiR1, VTT Technical Research Centre of Finland, has started a more detailed planning of the shutdown and decommissioning of the research reactor as a preparatory action to the possible decision of the closure of the facility. The decision to implement the plan is dependent on the outcome of efforts to arrange alternative, sustainable funding for continued operation of the research reactor.

According to the governmental policy decision of 1983 (OECD/NEA 1984) and later decisions by the Ministry of Trade and Industry, the licensees are obliged to prepare plans for technical decommissioning (dismantling, decontamination, demolition, management and disposal of wastes arising from decommissioning) for regulatory review and to update them every five years. These plans aim at ensuring that decommissioning can be appropriately performed when needed and that the estimates for decommissioning costs are realistic.

In Finland no significant facilities subject to nuclear energy or radiation legislation are being decommissioned and no final decisions on such decommissioning projects have been made. Although the implementation of decommissioning is not a topical for decades, technical plans and cost estimates for decommissioning are already needed for making the appropriate financial provisions and for proving the feasibility of safe decommissioning and the solution for the final disposal of radioactive wastes.

The Regulatory Guide YVL 8.2 *(Premises for removal of regulatory control from nuclear waste)* is currently being updated to cover also removal of control from large amount of material resulting from decommissioning and release of regulated sites. The relevant IAEA safety guides will be used as reference for the revision. This regulatory guide is expected to give also some guidance on the decommissioning strategies and the pertinent safety and radiation protection requirements.

The latest updates of the NPP decommissioning plans were published at the end of 2003. The next plan for the Olkiluoto NPP to be prepared by the end of 2008 will also include the decommissioning plan for Olkiluoto 3 reactor unit that is presently under construction and has been planned to be taken into operation in 2009.

The decommissioning plans include assessments of occupational and off-site radiological safety of the operations. They include rather detailed descriptions of the required dismantling, decontamination, demolition as well as waste management and disposal operations and estimates of workforce and other resources needed. The plans are based on the actual designs of the nuclear facilities and they take into account the

activity inventories in the facilities. The contamination levels in the facilities are followed by means of specific monitoring and recording programmes. The cost estimates of decommissioning are depending on the amount of waste to be disposed as radioactive waste and thus the limits to be applied for removal of material from control (clearance limits). The respective Guide YVL 8.2 is being revised to cover also bulk amount of waste resulting from decommissioning and the premises for release of regulated sites.

The decommissioning plan of the research reactor FiR 1 is also updated every five year, the latest update has been carried out in the year 2005. Studies are under way on the technical feasibility of disposing of the decommissioning wastes of the research reactor in the disposal facility at the Loviisa site.

The procedures applied for controlling, auditing and reviewing the technical plans and cost estimates for decommissioning and waste management and disposal are described in sections 2.2.4 and 2.2.5.

The present differences in decommissioning strategies (immediate vs deferred) between the different reactor units can be reasoned based on the different needs to continue the maintenance of the required infrastructure at the sites. In Loviisa there are presently no plans to build additional reactor units. Therefore, it is more appropriate to perform the decommissioning operations within a rather short time interval during which the spent fuel from the Loviisa NPP is transported to Olkiluoto after a short local intermediate storage. In contrast, in Olkiluoto, the decommissioning of the units 1 and 2 can be deferred while the other nuclear facilities (reactor unit 3, spent fuel interim stotarage and the spent fuel disposal facility) continue to operate long time (cf. Fig. 1) after the shutdown of the units 1 and 2.

2.2.1.1 Technical plan and cost estimate for the decommissioning of the Loviisa reactor units

The decommissioning plan for the reactor units Loviisa 1 and 2 is based on 50 years operation and immediate dismantling. Large and heavy reactor components, e.g. reactor pressure vessels and steam generators, will be removed intact without cutting them in pieces. The advantages of the method are saving of time and reduced occupational radiation doses. Activated components accumulated during the operation will be packed into the reactor vessels which will serve as additional barriers. The waste will be disposed of at the Loviisa site by extending the current LILW repository.

The originally designed technical life of the Loviisa Power Plant was 30 years. On the basis of the operating experience gathered at the plant, the preventive maintenance performed, and the modernization and power upgrading project carried out in 1995 - 1998, the operational life has been extended to 50 years. Towards the end of the operational life it has to be assessed, whether continued operation of the power plant will still be justifiable, considering the technical and economic aspects, or whether the plant will be decommissioned. The decommissioning means that the systems, components and constructions that contain radioactive substances will be dismantled and removed from the plant.

As the previous plans, the most recent decommissioning plan (Fortum 2003) is also based on immediate dismantlement after the shutdown of the power plant. Plans have been made to carry out preparation of the power plant systems etc. for dismantlement and the actual decommissioning work under supervision of the experienced operating personnel of the plant. Only the radioactive plant systems, components and structures will be dismantled and disposed of; thus the "green field" option is not required.

At the Loviisa NPP, spent fuel management was previously based on the transport of spent fuel back to the Soviet Union/Russia after storage of five years at the plant. This spent fuel management procedure would have made it possible to dismantle all systems etc. that contain radioactive substances after the last return lot. The amendment to the Nuclear Energy Act adopted on 29 December 1994 prescribes that the spent fuel generated in Finland must be conditioned, stored and finally disposed of in Finland. As a result, spent fuel has no longer been returned to Russia since 1996. Spent fuel will be stored at the power plant for 20 years after the shutdown of the power plant.

The facilities and systems intended for the storage of spent nuclear fuel will be made independent after the shutdown of the power plant. The cementation based solidification plant of radioactive waste and the repository for operating waste will also be made independent after the shutdown of the power plant. The decommissioning plan also takes the future dismantlement of all these independent plants and the future sealing of the repository into account.

The studies conducted in 2003 (Fortum 2003) focused on the effects of the potential extension of the power plant life to 50 years on the decommissioning plans. The main subjects of study included the activity inventory of decommissioning waste, the working plan, estimated occupational radiation doses in the decommissioning work and safety analysis of the final disposal of decommissioning waste.

With regard to decommissioning of the Loviisa NPP, the primary alternative is to remove the radioactive material soon after the shutdown of the power plant. In that case it will be possible to use the power plant's operating personnel, who is familiar with the plant, for the decommissioning work. The purpose is not to restore the power plant site to its natural state, but the decommissioning of the plant will involve dismantling the systems, components and structures that contain radioactive substances and removing them from the plant. "Clean" buildings and their systems can be further used, as far as possible, to serve the plant parts that will continue operating independently after the decommissioning of the power plant. This will primarily concern the spent fuel storage to be made independent, which is linked in many ways with both of the Loviisa reactor units. The cementation based solidification plant of radioactive waste, which is also to be made independent, will be dependent on the auxiliary processes of Loviisa 1 owing mainly to the liquid waste storage, whereas the repository for operating waste functions almost independently by now. Insofar as the reuse of the "clean" buildings is not considered appropriate, the buildings can be pulled down later on. The plant site can later be used, for instance, for power production, but this is not included in the decommissioning plan.

The estimated amount of radioactive decommissioning waste and the estimated dose rate levels at the plant during the decommissioning are based on activation calculations and on the dose rate and activity measurements carried out at the plant. The total accumulations of contaminated material are based on the anticipated accumulation until the end of the operational life.

When the time for decommissioning comes, facilities will also be constructed for the final disposal of decommissioning waste as part of the repository for operating waste built in the bedrock of the plant site. This part of the repository has not yet been licensed, and the required decisions and permissions will be applied for this enlargement part in due time. The decommissioning waste will be mainly packed into concrete and wooden packages. Large components, such as reactor pressure vessel and steam generators, will be disposed of in one piece.

The overall schedule for the decommissioning is based on a power plant unit operating period of 50 years. The shutdown of the power plant will be followed by a two year preparatory phase before the actual dismantling work begins. The work to be carried out during the preparatory phase will include transfer of the spent fuel from the pools of the reactor building to the spent fuel storages, flushing and decontamination of the process systems (removal of radioactive deposits etc. using a chemical solution) and construction of the necessary hauling openings for the transfer of large components.

The decommissioning work will begin with the conditioning of the reactor pressure vessel and other activated material and continue with the dismantling of the primary circuit and other contaminated systems. The dismantling can be done using currently known methods. The last step will be to dismantle the spent fuel storage and the waste solidification plant, which have been made independent. The decommissioning of the Loviisa NPP will take 27 years in all.

The report on the decommissioning of the Loviisa NPP is based on the following bases and assumptions:

- Commercial operation of the power plant units will last for 50 years.
- New equilibrium load scheme with 4% enriched fuel.
- Spent nuclear fuel will be stored at the power plant site for 20 years after the termination of the power plant's commercial operation.
- The reactor pressure vessels with their internals will be removed in one piece and the pressure vessels will be used for the final disposal (as final disposal containers).
- All the activated and contaminated material will be dismantled up to the specific activity limit defined by the authorities (Premises for removal of regulatory control from nuclear waste, YVL Guide 8.2).
- The essential decommissioning measures will be optimized with regard to radiation protection (the ALARA principle).

- The decommissioning waste will be disposed of in the facilities to be built as part of the repository for operating waste (VLJ Repository) in the third construction stage.
- Dismantlement of the facilities to be made independent (spent fuel storages, the cementation based solidification plant of radioactive waste and the repository for operating waste) and sealing of the waste repository will be taken into account;
- The technical and economic assessments are based on the technology employed and the procedures followed at present.

Estimate of the decommissioning costs

The decommissioning costs of the Loviisa Power Plant have been assessed on the basis of the proposed plans and estimates of the workload. With regard to the purchases of different types, the assessments are based on the empirical cost data gathered at Fortum and on the cost estimates obtained from equipment suppliers. On the whole, the decommissioning will be a very labour-intensive project, and so the amount of labour costs will be extremely significant. Table 2 shows the cost estimate of the Loviisa Power Plant decommissioning at the December 2003 cost level.

Table 2. Decommissioning costs of the Loviisa Nuclear Power Plant (Lo1 and Lo2) (Fortum 2003)

Cost item	**Costs, million euros**
Project administration and design	3.9
Preparatory phase	31.1
Handling of activated material	10.9
Handling of contaminated material	81.0
Treatment of maintenance waste	1.1
Waste packages	3.5
Repository	12.5
Operating costs of the decommissioning phase	52.7
Costs in all	**196.7**
Reserve to cover unspecified costs, 10%	19 .7
Total costs	**216.4**

The cost estimate of the decommissioning of both reactor units of Loviisa NPP at the December 2003 price level thus amounts to some 216 million euros (excluding VAT). The cost estimate is based on the plans drawn up and the amounts of work assessed during the studies. The cost estimates have not taken account of any positive values linked with the decommissioned plant or plant site, such as the value of metals or components when recycled and reused, or the value of the plant site for the purpose of, for instance, power production.

2.2.1.2 Technical plan and cost estimate for the decommissioning of the Olkiluoto reactor units

The next decommission plan to be prepared in 2008 for Olkiluoto 1 and 2 units will be based on 60 years of operation and 30 years of safe enclosure. For Olkiluoto 3, immediate dismantling is considered as an option as well. As in the case of Loviisa, the reactor pressure vessels of Olkiluoto 1 & 2 are planned to be removed and disposed as such, in one piece at Olkiluoto site.

The decommissioning plan of 2003 (TVO 2003) for the nuclear power plant units Olkiluoto 1 and Olkiluoto 2 is based on approximately 40 years of operation and 30 years of safe storage prior to dismantling. The activated reactor pressure vessels (RPV) will be removed and disposed of as such, in one piece. The segmented activated reactor components will be packed into the RPVs. The fuel bundle parts, including the fuel channels will be handled with the spent nuclear fuel. The partially activated biological shields and the heat insulators of the reactors will be segmented and packed according to their activity into concrete containers, plywood boxes or steel drums. The contaminated process systems will be dismantled, segmented and packed into lighter concrete boxes. Large contaminated components will be disposed of as such, segmented into smaller size only according to the transport constraints. The total weight of the radioactive waste to be disposed of is 10 800 metric tonnes and the required space including the containers is 26 600 m^3. In addition to the actual dismantling waste of the power plant units, this quantity also includes activated spent reactor internals accumulated during the plant operation (excluding fuel channels and bundle parts), dismantling waste from the interim store for spent fuel, and the racks for fuel and control rods. The total activity at the time of final disposal will be 2×10^{16} Bq.

The waste will be disposed of in the bedrock of Olkiluoto by extending the current VLJ Repository (final repository for low and intermediate level operating waste). The reactor pressures vessels will be placed vertically one on top of the other in a separate 105 m deep shaft. The contaminated waste and the activated concrete of the biological shields will be placed into two shotcreted bedrock silos.

Excluding the safe storage period, the time required for the dismantling of the two power plant units, handling of the spent reactor internals and the waste disposal will total approximately 15 years, including about 5 years for the actual dismantling.

The estimated collective dose to the dismantling workers is 4 manSv, covering all the decommissioning phases from the preparation of the safe storage to the end of the disposal activities. According to the safety analysis, the long term safety would meet

the requirements established for the final disposal of the low and medium level reactor operating waste. Presently, there are no decommissioning specific safety criteria.

At the price level of December 2003, the total cost of the decommissioning, including the disposal of wastes, is estimated to be approximately 140 million euros. The cost estimate (Table 3) includes safe storage period, dismantling works and final disposal of the arising nuclear wastes. The cost estimate includes also the handling and disposal of reactor reactor internals and core component as well as the transport and disposal of fuel and control rod racks but not the decommissioning costs of the separate interim storage of spent fuel.

The personnel costs have been estimated in the connection of work planning. The costs have been estimated separately for the own and for the outside contractor's staff by personnel categories. The costs of different stages of decommissioning have been originally estimated at different time points and they have been converted to correspond the price level of December 2003 by adjusting with the average of indexes for building and of wage and salary earnings.

The cost estimates do not include the personnel costs of TVO's base organisation and the costs of authority oversight. They are included in other items of the annual estimates for the total waste management, disposal and decommissioning costs (see section 2.2.5.

Table 3. Estimate of the decommissioning costs of the Olkiluoto Nuclear Power Plant (Olkiluoto 1 and 2) (TVO 2003)

Cost item	Costs, million euros
Shifting the units to safe storage condition 2018 - 22	**10.1**
Planning	1.0
Preparation for shifting to safe storage	6.3
Cutting into pieces and packaging of reactor internals and core components	0.6
Partial filling of pressure vessels by concrete	0.3
Reserve for updating the plans of shifting to safe storage	2.0
Safe storage for 30 years per unit 2018 - 48	**4.5**
Dismantling 2048 - 52	**65.4**
Activated parts of the plant	*23.3*
Project administration, planning and operation	6.1
Loosing of pressure vessel and transfer to the yard	2.2
Dismantling of biological shield, heat isolation plates and basements of the reactor hall	5.5
Packaging	1.6
Reserve for updating the plans for leaving the pressure vessels uncutted	8.0
Contaminated parts of the plant	*29.9*
Project administration, planning and operation	2.1
Activity measurements and samplings	0.6
Dismantling opeations	24.5
Packaging	2.7
Reserve for expanded dismantling operations	*12.2*
Final disposal of decommissioning wastes 2045- 55	**41.7**
Construction and investments	*21.8*
1.4.1.1 Construction including investigations	3.3
1.4.1.2 Final disposal facility	16.1
1.4.1.3 Equipment for lifting and local transport	2.5
Operation	*8.0*
Disposal facility (work, emplacement concrete etc)	6.9
Transporting works	1.1
Repository sealing	*6.9*
Construction	0.7
Sealing structures, materials and works	5.8
Reserve for additional cost for bentonite backfill around pressure vessels	0.5
Reserves for updating the final disposal plans	*5.0*
Costs in all	**121.7**
Reserve to cover unspecified costs, 15%	*18.3*
Total costs	**140.0**

2.2.1.3 Technical plan and cost estimate for the management and final disposal of nuclear waste and decommissioning of the research reactor FiR 1

The plan for decommissioning and nuclear waste management for the research reactor FiR 1 is based on immediate dismantlement after the final shutdown of the reactor. Experienced personnel will be still available to conduct the decommissioning work. The decommissioning waste is supposed to be disposed of in the repository constructed in the bedrock of the Loviisa nuclear power plant site at the depth of 110 m. At the moment preparatory work has been done to clarify the possible problems related to some

special types of decommissioning waste from the research reactor in the surroundings of decommissioning waste of the nuclear power plant. The goal is to work out a binding agreement between VTT and the Loviisa NPP about the final disposal of decommissioning waste arising from the dismantling of FiR 1 in the said repository.

The decommissioning waste studies concentrate mainly on the long term safety of the decommissioning waste disposal. The main part of the active reactor components will be packed in concrete packages in the waste disposal facility, which means an additional barrier against the ground water flow. Among others the amount and behaviour of some long-lived radioactive isotopes like ^{14}C belong to these studies. Triga reactors have typically plenty of irradiated graphite consisting components (Salmenhaara 2004).

VTT has had already for sixteen years an agreement in principle about the possibility to use the final disposal facility for spent fuel for the spent fuel arising from the Finnish power reactors. This repository is planned to be operational in around 2020. Later this agreement with TVO was transferred to the joint nuclear waste management company Posiva. According to the current operation license of the research reactor, VTT has to achieve a binding agreement with either Posiva or USDOE about the back end solution for the spent fuel. USDOE has announced that the possibility for returning back spent fuel from foreign research reactors until 2016. The Ministry of Trade and Industry has accepted this as sufficiently binding agreement. Hence a binding agreement between VTT and Posiva is needed only in case the operation of the research reactor could be continued also after the expiry of the present operating license (at the end of 2011) and further beyond the year 2016.

The latest update of the estimated costs of decommissioning of the research reactor and managing and disposing of the spent fuel and the wastes arising from the dismantlement is presented in Table 4..

Table 4. Cost estimate of the planned decommissioning and waste management and disposal for the Finnish research reactor FiR 1 (Triga Mark II). (price level of September 2005)

Cost item	**Cost (1000 Euro)**
Planning	800
Dismantling	960
Final disposal of the decommissioning waste	620
Final disposal of spent fuel, domestic alternative	2 740
Expenses for the authorities	180
TOTAL	**5 300**

2.2.2 Spent fuel management and disposal programme

The Finnish fuel cycle policy is based on the once-through option. The nuclear legislation provides for disposal of nuclear waste into the Finnish bedrock. In 1999 Posiva Oy proposed, in a Decision-in-Principle application, to site a disposal facility for spent nuclear fuel at Olkiluoto in Eurajoki, a couple of kilometres from the NPP. This application was approved by the municipality of Eurajoki in January 2000, the Finnish Government made the Decision-in-Principle in December 2000 and the Parliament endorsed it in May 2001. The application for the construction licence is scheduled to be submitted by the end of 2012 and the operating licence application around the year 2020. In the context of endorsement of the Decision-in-Principle concerning the fifth reactor in Finland in May 2002 the Finnish Parliament also endorsed a separate Decision-in Principle on the extension of the Olkiluoto disposal facility to cover the spent fuel from the new unit. The various steps from siting until to closure scheduled for the Olkiluoto disposal facility are illustrated in Fig. 1.

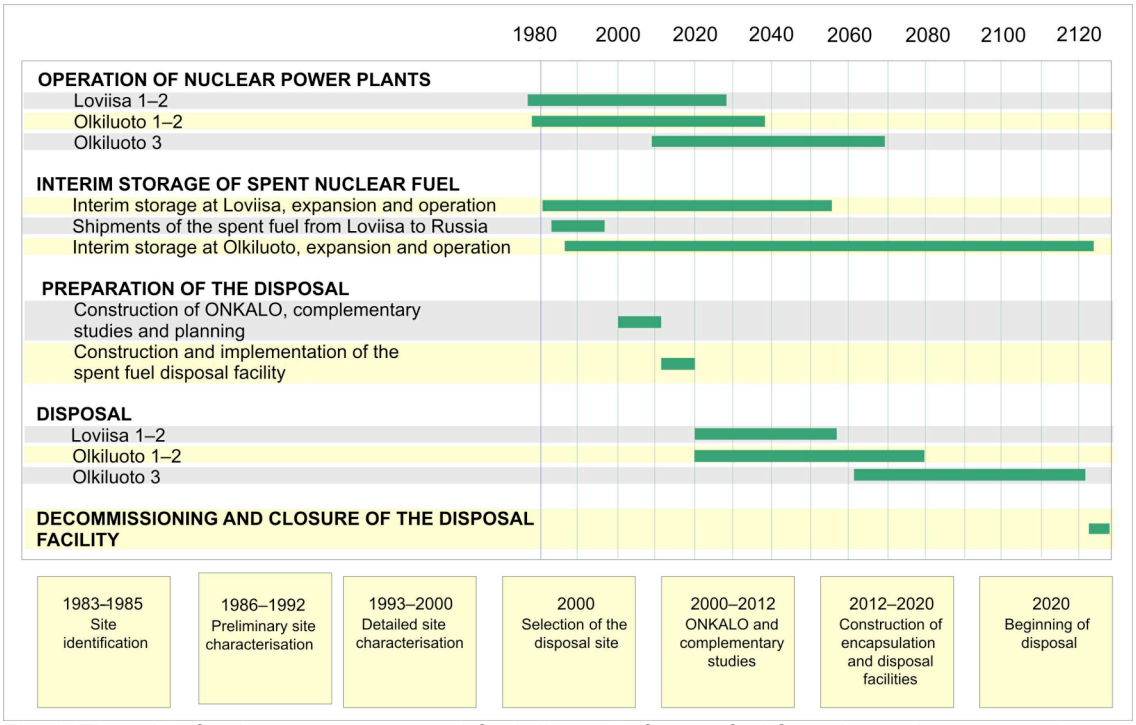

Fig. 1. Timetable for the management and final disposal of spent fuel from the nuclear power plants at Loviisa and Olkiluoto.

The current estimate for the amount of spent fuel to be disposed of in Olkiluoto is 5 640 tonnes: 1 020 tonnes from Loviisa 1 and 2, 2 620 tonnes from Olkiluoto 1 and 2, and 2 000 tonnes from Olkiluoto 3. The estimates are based on the expectation that the units Loviisa 1 and 2 are operational until 2030, Olkiluoto 1 and 2 until 2040 and Olkiluoto 3 until 2070 (Fig. 1). However, the operation licences of the NPPs are granted only for 10 to 20 years at a time.

Spent fuel will be stored in water pools for some decades and thereafter transferred to the encapsulation and disposal facilities which will be located at Olkiluoto. Spent fuel would be encapsulated in copper-iron canisters each containing 12 BWR or PWR

(Loviisa 1 & 2) fuel assemblies. The canisters for Olkiluoto 3 reactor (EPR) fuel are planned to contain 4 PWR fuel assemblies. The canister design consists of a cast iron insert as a load-bearing element and an outer container of oxygen-free copper to provide a shield against corrosion. The canisters will be emplaced in a network of tunnels, which will be constructed at a depth of about 400 to 500 m in crystalline bedrock. The annulus between the canister and the rock wall will be filled with compacted bentonite.

For disposing of the spent fuel from the research reactor, two options are available: either returning to the USDoE or in the repository for spent fuel arising from the Finnish NPPs.

2.2.3 Financial and other responsibilities for nuclear waste management and decommissioning of nuclear facilities

According to Section 9 of the Nuclear Energy Act, a licensee, whose operation generate or have generated nuclear waste, shall be responsible for all decommissioning and nuclear waste management and disposal measures and their appropriate preparation, and is responsible for the arising expenses. In case of the research reactor, the operator is also fully responsible for spent nuclear fuel and waste management and disposal as well as for decommissioning of the facility. The State has deposited main part of the necessary funds to the State Nuclear Waste Management Fund on behalf of the operator of the research reactor.

The decommissioning has been taken into account in the design of the new NPP unit Olkiluoto 3. For example, the layout of the plant has been designed to have an easy access for repair and maintenance. In addition, the buildings and rooms of different radiation levels have been separated to facilitate the control of contamination and radiation levels and to keep the dose rates low during operation and maintenance. The aim of the design has also been to minimize the amount of radioactive waste, to ease dismantling and removal of components and structural materials, and to reduce decommissioning costs.

The NPP utilities FPH and TVO themselves take care of interim storage of spent fuel, of management of LILW including disposal, and of planning and implementation for the decommissioning of the NPPs. Their jointly owned company, Posiva, is taking care of the preparations for and later implementation of spent fuel encapsulation and disposal.

Section 50 of the Radiation Act provides for management of radioactive waste from non-nuclear applications. The responsible party (i.e. the licensee or any company or organization which uses radiation sources in its practices) is required to take all measures needed to render radioactive waste arising from its operation harmless. In case where the practice produce or may produce radioactive waste that can not be rendered harmless without considerable expenses, a financial security shall be furnished to ensure that these costs and those arising in performing any necessary environmental decontamination measures are met.

The state has the secondary responsibility in case that a producer of nuclear waste (Nuclear Energy Act, Sections 31 and 32) or other radioactive waste (Radiation Act,

Section 51) is incapable of fulfilling its management obligation. STUK operates an interim storage of radioactive waste, where limited amounts of spent sealed sources and other non-nuclear radioactive waste are received upon compensation covering their further management costs.

2.2.4 Estimation and reviewing of future costs for nuclear waste management and decommissioning of nuclear facilities

Costs of dismantling of nuclear facilities, management and disposal of wastes, including those arising from decommissioning of the NPPs, are included in the price of nuclear electricity. Initially, the nuclear power companies had internal funds for that purpose, but by virtue of entry into force of the Nuclear Energy Act, the State Nuclear Waste Management Fund was established under the Ministry of Trade and Industry (MTI) in 1988. To ensure that the financial liability is covered, the nuclear power companies and the operator of the research reactor are each year obliged to present cost estimates for the future decommissioning and management and disposal of nuclear wastes and take care that the required amount of money is set aside to the State Nuclear Waste Management Fund. The aim of this annual procedure is to ensure that the funds are always sufficient to cover the costs of future decommissioning of the pertinent nuclear facilities and of managing and disposing the amounts of wastes that have arisen until a particular point of time in case the operation of the facility is decided to be discontinued since that time point.

In order to provide for the insolvency of the nuclear utilities, they shall provide securities to MTI for the part of financial liability which is not yet covered by the Fund. Shortly after the start-up of a nuclear power reactor unit, the share of the liability covered by securities is larger as the deposited amounts of money have not accumulated sufficiently. According to the Nuclear Energy Act the annual fund targets for waste management, disposal and decommissioning can be augmented gradually (within 25 years) along the operating years of a nuclear facility and the annual fund target can be less than the total assessed liability. The unfunded liability is then covered by securities. The ratio of the Fund target to the assessed total liability shall be increased gradually, so that the fund target shall reach the assessed liability in sufficient time before it is estimated that the nuclear facility will cease operations. The types of acceptable securities are described in section 3.1.

In case of the research reactor, the same funding system is applied and the operator is also fully responsible for decommissioning of the facility, for spent nuclear fuel and other nuclear waste management and for disposing of the spent fuel and operational and decommissioning wastes. In that case the state has deposited most part of the necessary funds to the State Nuclear Waste management Fund on behalf of the operator of the research reactor (VTT) and the operator the rest (about 20%).

The Ministry of Trade and Industry is the ministry responsible for the nuclear energy field in Finland. One of the Ministry's duties is to oversee that the plans for decommissioning and waste management and disposal by the nuclear power companies and the implementation of these plans comply with the national policy. Each year the Ministry

also determines, with its separate decisions for each licensee, the amount of money (Fund target) each licence-holder must have in the Fund. The additional amount of money that needs to be paid to the fund is dependent on the total liability at the end of each year and on the Fund holding at the end of the previous year. The implemented waste measures during the considered calendar year lower the cost estimate of future costs and thereby reduce the amount of liability. Furthermore, the shares of each licensee out of the annual profits/losses of the fund reduce/increase their annual payment. Especially in the implementation phase, the Fund target for the calendar year can also be lower than the Fund holding at the end of the previous year. In that case the pertinent licensee is refunded with the said surplus. The Ministry also controls that the operation of the State Nuclear Waste Management Fund complies with the legislation.

The Radiation and Nuclear Safety Authority (STUK) reviews, especially from the safety point-of-view, the proposals - on the basis of which the assessed liabilities for all future decommissioning and waste management and disposal measures are established - and gives its opinion to the Ministry of Trade and Industry. In addition, the VTT Technical Research Centre of Finland reviews the proposals and cost estimates of power companies and gives the Ministry its opinion.

In 2003 the Ministry contracted the Lappeenranta University of Technology to evaluate the validity and credibility of cost estimates for the decommissioning of the Finnish nuclear power plants. The evaluation (Kyrki-Rajamäki & Vihavainen 2003) was divided into following sub-topics:

- bringing of nuclear power plants under controlled dormant state (preservation),
- controlled dormant state (preservation),
- dismantling of activated parts of the nuclear power plants,
- dismantling of contaminated parts of the nuclear power plants,
- additional necessary dismantling.

The evaluation focused on the coverage and uncertainties of the cost estimates, which form the basis for the preparedness of waste management liabilities of the power companies. The results of the evaluation indicate:

- decommissioning plans are realistic, feasible and detailed,
- implementation of decommissioning plans are based on modern techniques,
- the magnitude of the cost estimates are correct,
- cost estimates are based on detailed design,
- gaining of considerable cost savings is possible with detailed planning,
- better transparency for the cost estimates is recommended,
- improved coordination among power companies is suggested in order to increase the comparability of cost estimate sub-topics of the waste management plans,
- the Finnish practise is compatible with the new recommendations of IAEA,
- annual check up of the cost estimates based on index increment is not solely enough to keep plans upto-date, more exhaustive check up of the plans after every five years is still necessary.

The study included also a brief discussion regarding the international comparison of decommissioning costs estimates (NEA 2003). That comparison gives an variation in-

terval for specific decommissioning costs of PWR plants of about 200-500 USD/kW and for VVER-type reactors 162-506 USD/kW; the lower end corresponding to the cost estimate for Loviisa 1&2. The explanation given in (NEA 2003) to this low estimate refers to the strategy adopted that reduces waste cutting, packaging and transport costs; the activated metal pieces of the reactor core are kept inside the pressure vessel that is disposed of as one piece in a repository located on the reactor site. Similarly for BWR plants majority of the estimates are within a range of 280-550 USD/kW. The estimates for Olkiluoto 1&2 (76 USD/kW) and Oskarshamn 3 (104 USD/kW) in Sweden are both below the lower end of this range. The most recent Finnish estimates available for this review (applying the currency exchange rate (euro vs USD) at the end of 2002) for Loviisa is 202 USD/kW and that for Olkiluoto is 96 USD/kW. The report (Kyrki-Rajamäki & Vihavainen 2003) points out a few main differences in assumptions and conditions: In Finland only the radioactive materials are removed and the plant structures are not assumed to be dismantled completely ("green-field" state). Furthermore, the cost estimates are based on rather detailed technical plans and on the availability of experienced staff and existing infrastructure at the power plant sites. Cost reductions can also be achieved through the arrangements of disposal space for decommissioning wastes by expanding the already existing repositories for operational low and intermediate level wastes.

The Ministry of Trade and industry ordered another independent review from the Swedish ÅF-Process Ab (ÅF) (Lundberg 2005) of the cost estimate for the spent fuel encapsulation plant. This analysis involved assessing the cost estimates, or waste management schemes, which Finnish power companies bound by the nuclear waste management obligation submit annually to the Ministry of Trade and Industry for the basis of its decision on financial provision. The liability amount calculations under review encompassed the construction of the encapsulation plant and its encapsulation, as well as other onsite treatment processes of spent nuclear fuel at the encapsulation plant, including other related, relevant processes. On the basis of its analysis, the report presents, for example, figures comparing the Swedish plant project's cost estimates with the Finnish ones, and any reasons for the resulting deviations. The report does not give any suggestions that the Finnish estimates would be incorrect. The report pays attention to certain individual details related to the plant's operations and technique, which may later provide the party in charge of the encapsulation plant project with grounds for reviews and changes, while resulting in changes in future cost estimates.

2.2.5 Cost calculation methodology and cost estimates

Sections 35 to 53 of the Nuclear Energy Act provide detailed regulations for the financial arrangements for nuclear decommissioning and waste management and disposal and the Decree on the State Nuclear Waste Management Fund further specifies the financing system. Generators of nuclear waste are responsible for estimating annually future cost of managing the existing waste, including spent fuel disposal and decommissioning of NPPs. The Ministry of Trade and Industry (MTI) confirms the assessed liability and the proportion of liability to be paid into the Nuclear Waste Management

Fund (Fund target). The methodology and procedures to be applied in defining these proportions are described in more detail in section 3.1. The waste generators pay annually the difference of fund target and the amount already existing in the Fund, but can also be reimbursed if the Fund exceeds the liabilities. The waste generators shall provide securities to MTI for the portion of financial liability that is not yet covered by the Fund.

For the FiR1 research reactor somewhat modified practices are followed. The State has initially provided the funds on behalf of the operator (VTT) based on the cost estimates of future liabilities made at the end 1980's. Thereafter the cost estimates have risen, but the share of the operator of the research reactor (VTT) out of the profits of the fund has been large enough to augment the fund holding for the research reactor sufficiently to cover the increased liability. In the future, finally the State is in principle responsible for taking care of the payments (exceeding the annual profits) to cover the difference between the Fund target and the amount already existing in the Fund. The possible interest reimbursements, exceeding the amount needed to augment the fund holding up to the current fund target, are returned to the State. However, in 2005 the operator (VTT) itself had to pay directly a substantial increase (+25%) to the fund holding as a result of the increase in the liability based on the revised cost estimate of the future liability.

In practice, the cost estimates are based on proposals provided annually by each licence-holder and confirmed, after scrutiny and sometimes negotiations, by the Ministry of Trade and Industry. The cost estimates are always calculated in current prices, on the basis of current plans and technology. No discounting is used. These confirmed estimates or assessed liabilities form the basis for establishing the amount of money that each licence-holder should have in the Fund. This amount that the Ministry also confirms each year is called fund target. It is then up to the Fund to see that the licence-holder's share of the money in the Fund is balanced with the fund target. In the connection of the description of the technical plans for the decommissioning of existing nuclear facilities the corresponding cost estimates for decommissioning have been described in section 2.2.1.

The current total estimates, including future costs from management and final disposal of existing waste quantities and from decommissioning of current NPPs and the research reactor and the management and disposal of arising decommissioning wastes, arise to about 1 450 million Euros with no discounting. The already completed waste management measures, such as the investments for the construction of the existing interim storages for spent fuel and the operational wastes as well as the construction of the two repositories for LILW operational wastes in Olkiluoto and Loviisa, in operation since 1992 and 1997, are not included in the cost estimates. At the end of the year 2005, the funded money covered the whole liability corresponding to the current waste amounts. The fund targets and liabilities covered by securities of the nuclear power companies are shown in Fig. 2. Only the liabilities regarding the management of waste resulting from the operation and decommissioning of the existing reactors (Loviisa 1&2 and Olkiluoto 1&2) are illustrated here. The reasons to the fluctuation during years 1994-95 in the amounts of securities needed are the following: first the increase is due

to the amendment of Nuclear energy act in 1994 requiring to take care of the final disposal in Finland of the spent fuel from the Loviisa power plant as well. The decrease in needed securities in 1995 is due to the establishment of the joint company, Posiva Oy, taking care of the spent fuel disposal for both companies (TVO & Fortum). At the same time the liability for TVO decreased slightly owing to this agreed co-operation in spent fuel disposal. The corresponding total cost estimate for the research reactor is presently 5.3 million Euros. Some details of the technical plan and the cost estimate for the research reactor are presented in section 2.2.1.3.

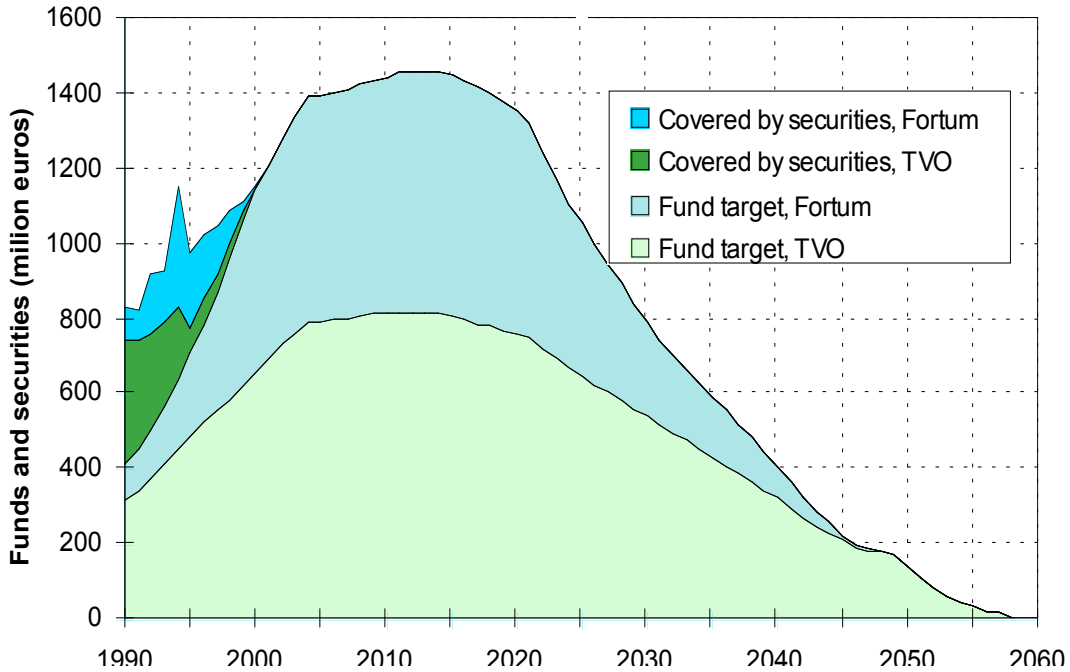

Fig. 2. Fund targets (for the decommissioning of the existing four power reactors and for management and disposal of all types of arising wastes) in the Nuclear Waste Management Fund and liabilities covered by securities. At the end of 2005 the total liability was 1450 M Euro and equalled the total fund target.

The licensee with a waste management obligation shall submit the waste management scheme to the Ministry of Trade and Industry for approval for the first time early enough before beginning the operations that produce nuclear waste, and at the latest in connection with the licence application for these operations. The waste management scheme needs to include the description of the technical stages of decommissioning as well as the arising costs.

According to the section 88 of Nuclear Energy Decree each licensee with a waste management obligation must annually complement the approved scheme for decommissioning and waste management and disposal and the associated calculations and, for the estimation of the assessed liability at the end of the calendar year, the Fund target in the next calendar year, and the assessed liability at the end of the next calendar year, and has to submit the following documents to the Ministry of Trade and Industry each calendar year, by the end of September:

- the revised and complemented scheme for decommissioning and waste management and disposal,
- information on the costs and prices of decommissioning and waste management and disposal measures,
- information on the amounts of nuclear waste included in the waste management and decommissioning obligation and on the necessary waste management and other measures, and
- the resultant calculation of the total costs of decommissioning and nuclear waste management and disposal.

The nuclear power utilities are responsible for the decommissioning and dismantling of their nuclear power plants and the waste management and disposal of all types of arising nuclear wastes including those arising from the decommissioning. The power companies (TVO and Fortum Power and Heat Oy) have agreed on co-operation regarding the disposal of spent fuel. Therefore, they produce cost estimations that cover both the cost items specific to each company and the cost items related to the spent fuel disposal and other topics where the companies cover costs jointly according agreed shares. In the future the new reactor unit, Olkiluoto 3, will change these shares how the spent fuel disposal costs will be distributed between the companies.

A simplified summary of the most recent cost estimate for the assessed financial liability at the end of 2005 is presented in Table 5. The estimates are based on the amounts of different types of wastes that have arisen until the end of 2005. The costs related to those parts of the decommissioning and waste management and disposal system that have already been implemented are not (any more) included in the liabilities for future costs. Example of these types of excluded costs are the investment cost for already operational repositories for low- intermediate-level operational wastes and for the spent fuel interim storages at Olkiluoto and Loviisa.

Table 5 Overview on estimated future decommissioning and waste management & disposal costs for the joint system of Loviisa NPP (488 MW_e (net)) and Olkiluoto NPP (2 x 860 MW_e (net)) in Finland (in price level at the end of 2005).

Decommissioning activity	**Years the activity took place / is expected to take place**	**Cost share (§) of TVO [Mio. Euro] Reactor units Olkiluoto 1 & 2**	**Cost share (§) of Fortum [Mio. Euro] Reactor units Loviisa 1 & 2**	**Annuity of decommissioning costs in relation to output over lifetime [ct/kWh; 4%]**	**Remarks**
1. Interim storages of spent fuel	The time schedules for dismantling the power reactor are described in sections 2.2.1.1&2. The time schedule for spent fuel management and disposal is shown in Fig. 1	83.8	47.7	A rough estimate of the share (undiscounted) of the cost items in this table out of the production cost is about 0.2 eurocents/kWh (@)	
2. Transport of spent fuel		7.0	3.1		Cost of transporting spent fuel (after interim storage) from Loviisa to Olkiluoto is taken into account
3. Final disposal of spent fuel		454.2	247.6		Disposal activities are planned to be started in around 2020
4. Treatment and final disposal of operational low- and intermediate level wastes in on-site repositories		12.3	19.0		The repository for LILW in Olkiluoto was commissioned in 1992. The Loviisa repository was commissioned for LLW in 1997 and for ILW in 2006
5. Safe enclosure, dismantling, decommissioning and disposal of arising wastes (#)		149.8	220.6		Immediate dismantling for Loviisa NPP and deferred dismantling (after 30 a) for Olkiluoto NPP
6. Research & Development and Administration		77.0	51.3		
7. Oversight costs of authorities and taxes		42.4	28.3		
8. Subtotals		**826.6**	**617.6**		
TOTAL		**1444.2**			

(§) Confirmed estimate for the financial liability of the existing nuclear power plants for the decommissioning and nuclear waste management and disposal at the end of 2005. The fund targets are equal to the liability; hence no securities are required.

(#) Cf. Tables 2 and 3 for the cost estimates of the decommissioning of the existing four reactors at Olkiluoto and Loviisa.

(@) In Finland the funding system and cost estimates for remaining decommission and waste management and disposal operations are based on undiscounted costs.

Sources: The estimates of future costs based on references (TVO 2003 and Fortum 2003) corresponding to the waste quantities at the end of 2005

3 Funds and fund management

3.1 Setting aside funds

When drafting the present legislation (defined in Nuclear Energy Act (1987) and Nuclear energy Decree (1988)) for financial provision for the costs of decommissioning and nuclear waste management and disposal in Finland the following two, now almost globally accepted principles were chosen as starting points (Väätäinen & Manninen 2002):

- The costs of management and final disposal of any quantity of nuclear waste and the decommissioning of the nuclear facilities should burden the cost of the nuclear electricity production giving rise to those wastes (timeliness).
- The collected funds should be available when decommissioning or waste management and disposal operations are carried out and they should be sufficient for these purposes.

In the Finnish solution, the manner of implementing the principle of availability and sufficiency strongly influenced the way of implementing the timeliness principle.

From the political point of view, the administration of the funds to be collected was an important question. Two opposite views were competing: on the one side, those who argued that the funds should be administered by the State, and on the other side, those who considered that the State was the most unreliable trustee of the capital. Several alternative funding methods were studied (Väätäinen & Manninen, 2002), e.g.:

- internal funding of nuclear companies,
- internal funding of nuclear companies plus full securities to be furnished to the State,
- internal funding of nuclear companies plus a bank deposit on a blocked account in the Bank of Finland,
- external funding without right of borrowing back,
- external funding with right of borrowing back with or without obligation to supply securities, and
- annual transfer of the funds to the State budget.

The outcome was a compromise, according to which an *external segregated* fund "State Nuclear Waste Management Fund" was established and detailed legislation for it was created. The nuclear companies are entitled to borrow back, at the market interest[2], 75% of the capital of the fund against full securities. The State has the right to borrow the remaining capital, i.e. at least 25%, at the same market interest rate. One factor contributing to this compromise was that the companies had already collected, pursuant to the then existing obligations, a relatively significant amount of money and a sudden transfer of that money into the Fund would have been complicated. Further

[2] The market interest rate is presently defined in legislation as Euribor - 0.15 %

reasoning or driving forces to the choice of the present system could be thought to be the wish to have clear division of responsibilities between the utilities and the authorities. Also one wanted to clearly restrict the possibilities of the state to utilize the collected funds for other, non-related, purposes. One additional aim was to make the system less sensitive to changes in the ownership of the operating companies.

As mentioned earlier, the primary responsibility for decommissioning and nuclear waste management and disposal is distributed to the licence-holders while the State has a supportive back-up role only. Consequently, it was considered that it would not be appropriate to collect funds from the licence-holders through a system based on a levy. Instead, the selected system was based on the requirement that at any moment there shall be, in the Fund, sufficient funds available to cover the liabilities for remaining future decommissioning and waste management and disposal measures necessary for the wastes produced up to that moment. Accordingly, the capital of the Fund is annually adjusted, normally with additional contributions from the licence-holders. But repayments from the Fund to the operators are also possible, especially in the active implementation phase.

It is worth stressing that the Fund does not pay for the waste management measures but only always continues to keep in safe the money corresponding to the costs of the remaining measures that are planned to be carried out at a later time point. Theoretically, all the funds have been returned as cost reimbursements to the operators afterwards when they have carried out all the necessary decommissioning and waste management and disposal operations. For these reasons, the Fund could be described as a “guarantee fund”.

No obligation of balance-sheet-specifications in order to control the source of the money paid into the Fund has been set for the licence-holders. Consequently, on the basis of the funding system it is not possible to count precisely the effect of waste management costs on the cost of nuclear electricity. This counting of total costs cannot simply be made, for example, by summing up the annual payments, which are the differences of the fund targets for subsequent years taking into account the annual profit by interests gained or losses. Furthermore, the realized costs of measures carried out during a calendar year could be higher or lower than the pertinent cost estimates for these implemented tasks. However, outside the funding system it is possible to make a rough estimate of the average share of the total back-end costs (decommissioning, waste management and disposal) out of the total production costs is about 0.2 €cents per produced power in kWh.

The costs of dismantling and decommissioning and management and disposal of thereby arising wastes immediately turn to “costs of remaining liabilities, when a facility is taken into operation. If such a large sum, forming a considerable portion of the total cost of decommissioning and waste management and disposal, were immediately transferred to the Fund, the effect of the costs would not be timely and correctly included in the production costs of electricity. Also, the construction costs of final disposal facilities for spent fuel constitute a similar type of significant investment costs, to be completely discharged only in the distant future. When creating the funding system, this problem was solved by a provision that allows, during the first 25 years of opera-

tion of a nuclear facility, to accumulate the fund holdings of the operators gradually by roughly constant annual increments to cover an increasing fraction of the estimated future costs (liability). However, in order to cover the total liability, the licence-holder must give full securities to the State to cover the difference of the liability and the amount of the funded capital. For the existing four nuclear power reactor units in Finland, the 25-year distribution period is now over.

According to the Nuclear Energy Act the Ministry of Trade and Industry may accept as security only:

- credit insurance provided by an insurance company as referred to in section 1 of the Insurance Companies Act (1062/79);,
- direct liability guarantee provided by a Finnish savings bank; or (396/2000), and
- such real estate mortgage or direct liability guarantee by a Finnish corporation as has been accepted by the Government as corresponding in reliability to the security referred to in bullet points 1 or 2.

A security with a validity period of less than five years cannot be accepted.

In a way, one can say that each licence-holder has its own “account” in the Fund and the State authorities regularly establish the required balance of that account. According to the Nuclear Energy Act, the transfer of a nuclear facility to another legal person does not automatically transfer the obligation of decommissioning and waste management and disposal nor the “account” to the new owner, but the transferee has to open an account of its own. However, by consent of the authorities the obligation of waste management and the “account” can be transferred. In the case where the licence-holder with an obligation of waste management is no more capable to take care of its obligation for financial provision and/or measures of waste management, the State can take over both the waste and the “account”. The securities furnished by the licence-holder to the Fund guarantee that the Fund can return funds to the State in time with the actual decommissioning and waste management and disposal measures.

According to the Nuclear Energy Act, the legal person whose activities produce nuclear waste is fully responsible for the respective nuclear waste management including decommissioning and dismantling. It can be released from that obligation only by the consent of the Government. If a nuclear power company ceases to exist or becomes unable to fulfil its obligation, the task is transferred to the State. As described in section 1.2, the Ministry of Trade and Industry may order various licensees under the waste management obligation to undertake decommissioning and waste management and final disposal measures jointly.

3.1.1 Assessment of the liabilities

As mentioned previously, the financial provisions for the future management of nuclear wastes are based on the principle that the funds, covering the costs of remaining operations needed to manage the waste that has already been produced, are available at any moment. Accordingly, the payments to the State Nuclear Waste Management

Fund are based on the estimated costs for the future decommissioning of nuclear facilities as well as for the management and final disposal of the currently existing amounts of nuclear wastes.

In practice, these estimates are based on proposals provided annually by each licence-holder and confirmed, after scrutiny and sometimes negotiations, by the Ministry of Trade and Industry. The cost estimates are always calculated in current prices, on the basis of current plans and technology. No discounting is used. These confirmed estimates or assessed liabilities form the basis for establishing the amount of money that each licence-holder should have in the Fund. This amount that the Ministry also confirms each year is called fund target. It is then up to the Fund to see that the licence-holder's share of the money in the Fund is balanced with the fund target.

To take into account the "fixed costs", i.e. costs the total amount of which is not at all or rather weakly linked to the life cycle of the facility, the fund target is gradually increased, during the first 25 years, in proportion to the passed years of operation, so that the capital would reach the assessed liability sufficiently early before the estimated cessation of the operation of the nuclear facility. From a licence-holder's point of view, the gradual collection method supports evenly distributed transfer of future decommissioning and waste management and disposal costs to the cost of electricity.

The detailed instructions for determining the fund target as a fraction of the liability are given in a Decision by the Council of State (Government). The fund target depends on the energy produced, but there is a minimum target that must be reached independent of energy output to cover a gradually increasing fraction of future fixed costs, such as dismantling of nuclear facilities and investments for building a spent fuel disposal facility.

It is worth noting that the assessed liability is not equal to the total costs of decommissioning and waste management and final disposal, but is based on estimated costs of the remaining measures. These estimates may change considerably during one year. Firstly, they are made according to the current plans and technology. Thus changes or corrections in plans, possible innovations and changes in the cost level as well as changes in national policy may change the assessed liability. An example of the policy changes is the requirement, introduced at the beginning of 1995, of final disposal of all spent fuel in Finland. Secondly, the waste management and disposal operations carried out by a licence-holder decrease the liability and sometimes these operations can be very costly. Actual examples of these kinds of changes are the completion of disposal facilities for low- and intermediate-level wastes. There are also other reasons that may give rise to sudden changes. For example, a possible change of decommissioning strategy from deferred to immediate dismantling could have a considerable impact on cost estimates. However, the effect of this type of strategy change is reduced considerably by the applied principle of no discounting.

Due to the fact that the fund targets are confirmed on the basis of assessed liabilities these sudden changes can counteract the aim that the cost of decommissioning and nuclear waste management and disposal should be smoothly transferred into the cost of electricity. To take this into account, the Nuclear Energy Act allows handling of an

exceptionally large sudden increase or decrease of the assessed liability, under certain precautions, by confirming temporarily (for a maximum of 5 years) the final liability lower/higher than the assessed liability.

3.2 Management of funds

The Ministry of Trade and Industry is the ministry responsible for the nuclear energy field in Finland. One of the Ministry's duties is to oversee that the plans for waste management by the nuclear power companies and the implementation of these plans comply with the national policy. Each year the Ministry also determines, with its separate decisions, the amount of money each licence-holder must have in the Fund. The Ministry also controls that the operation of the State Nuclear Waste Management Fund complies with the legislation.

The *State Nuclear Waste Management Fund* is responsible for the management of the capital collected for nuclear waste management. The Fund has a Board of four members nominated by the Government. The Board has to include representatives from the Ministry of Trade and Industry, Ministry of Finance and the State Treasury. The current Chairman comes from outside the public administration. The Fund has two auditors, one of whom is selected by the nuclear power utilities. The Fund also has a Managing Director, secretary and accountant, all part-time.

The share of each licence-holder of the capital of the Fund or the amount of money each licence-holder actually has in the Fund is called fund holding. The fund holding is made up of the payments by the licence-holder, its relative share of the accumulated interests of the capital and also potentially of its share of the losses. The fund holding varies during the year and can be regarded as the daily balance of a licence-holder's "account" in the Fund.

The fund holding related to the last day of the previous calendar year is compared by the Fund with the fund target determined by the Ministry of Trade and Industry, and the difference is defined either as a fee to be paid to the Fund or as a refund to be paid to the licence-holder. Refunds to the licence-holders will be more probable now, when the accumulation period of 25 years is over and plans and measures for waste management and disposal are being actively implemented. However, some returns have already earlier been occasionally paid due to changes in waste management plans and high real interest rates.

The accumulated capital is lent out by the Fund. A licence-holder or its shareholders can borrow back up to 75% of its fund holding against full securities, given to the Fund. The Board of the Fund must in each case approve these securities, which should not be mixed with the securities given to the Ministry for yet unfunded liabilities (cf. section 3.1). TVO normally provides direct liability guarantees of its shareholders and Fortum uses shares it owns in a hydropower company. In normal cases, the fixed period of a loan is five years. The interest rate is presently fixed by legislation to be Euribor - 0.15%. During the recent years the utilities have utilized to full extent their right of borrowing back from fund.

The remaining Fund capital, consequently at least 25%, is offered to the State as a loan with the same interest rate. The part of the capital that the licence-holders, their shareholders or the State do not want to borrow is to be invested against full securities in some other way yielding the best possible return (Section 52 of Nuclear Energy Act). The utilities and the State have normally borrowed the amounts they have been entitled to. Only earlier, during a certain period when the then fixed interest rate was rather high, did the State not fully use its loan right. The total amount of money borrowed by the State is today some 250 million euros.

The Ministry of Trade and Industry confirms, at the end of January, the assessed liabilities as of 31 of December and determines the corresponding fund targets. The State Nuclear Waste Management Fund then determines, in February, the fund holding of each licence-holder at the end of the previous year and the balance between this fund holding and the fund target. On the 1st of April, all payments to and from the Fund, including those connected with the issuing and repaying the loans, are made simultaneously, in practice largely compensating each other. Thus the actual money flows are often much smaller than the determined fees.

In the licence-holder's (company's) balance sheet a payment to the Fund is an expense, and a received payment from the Fund is an income. This expenditure or income is included into the balance sheet of the calendar year ending before the payment is actually made since it reflects the situation at the end of that year. The annual waste management fee is treated as a deductible expense and the possible return from the Fund is taxable income. However, the costs of waste management measures carried out by the company during the previous calendar year and which reduce the remaining waste management costs and in that way either have a decreasing effect on the fee or cause a payment from the Fund are treated as deductible expenses. Thus at least in theory, the actual expenses are balanced by the return from the Fund.

A Performance Audit (VTV 2004) of the State Nuclear Waste Management Fund was carried out by State Audit Office in 2004. The objective of the audit was to obtain a complete picture of how the fund works and to provide information needed by Parliament concerning off-budget funds. The main questions in the audit were how well the fund has succeeded in its statutory task, which is providing for the cost of nuclear waste management, and whether the process of estimating the costs of nuclear waste management has been handled appropriately. The audit did not evaluate the correctness of the total costs of nuclear waste management or the adequacy of securities.

With regard to the process of estimating the costs of nuclear waste management, the fact that provision for the cost of nuclear waste management is based on licence-holders' own estimates concerning costs and liabilities can be considered an operational and financial risk. This risk is reduced by the fact that the Radiation and Nuclear Safety Authority is asked for a statement regarding the safety of the measures presented in the nuclear waste management scheme. The fact that the Ministry of Trade and Industry has asked the Technical Research Centre of Finland for a statement on cost calculations, even though it is not obligated to do so, can be regarded as a good practice. The ministry should consider adding an obligation to the Nuclear Energy De-

cree according to which a statement on cost calculations should regularly be requested from at least one research centre that specializes in auditing technical calculations.

On the basis of the audit, costs are estimated in accordance with the provisions in the Nuclear Energy Act. The current process of estimating the costs of nuclear waste management can be considered appropriate.

The audit indicated that the fund's lending and investment activities have been conducted appropriately and, according to studies conducted by the fund, in a way that is practically risk-free. The fund has also administered assets so that they have maintained their value. The fact that neither the fund nor the ministry regularly monitors the fund's average return in relation to inflation can be considered a shortcoming. Monitoring should be developed.

The fund's investment activities have revolved around government bonds and serial bonds. If a higher return is desired, investments should be diversified. The Government bill regarded investment activities on the market as a last resort because of their demanding nature, however. Lending to the state is risk-free and the risks involved in lending to licence-holders has been offset by demanding that borrowers provide adequate securities. The payback clauses in bonds are intended to ensure that assets are available if needed. The loan period for licence-holders is one year, so the fund's liquidity in case excess amounts need to be returned has been ensured. The fund's evaluation of securities for loans can also be considered appropriate and adequate.

3.3 Special cases: Fall-back option and transfer of ownership

In case a nuclear facility should, for any reason, stop its operation and also stop to produce more waste, the money accumulated in the Fund and the securities given to the State would, together, always suffice to handle the situation and take care of the management and disposal of all the existing waste and dismantling and decommissioning of the nuclear facilities. As the actual decommissioning and waste management and disposal measures would not be taken immediately, the interest accrued, in the meantime, by this existing capital is used to compensate for the inflation and cost escalation.

Because of the method assumed to handle the high fixed costs and also major changes, the fund target can be less than the assessed liability. As a precaution against insolvency, the part of the assessed liability that is not covered by the money in the Fund must be covered with securities furnished by the licence-holder. The securities are given to the Ministry of Trade and Industry, not to the Fund. These securities can, according to the Nuclear Energy Act, be a credit insurance provided by an insurance company, direct liability guarantees provided by a Finnish commercial bank, real estate mortgages or direct liability guarantees by a Finnish association. Mortgages on a nuclear power plant itself cannot be accepted. Each security has to be separately accepted by the Ministry of Trade and Industry. In practice, TVO has used direct liability guarantees of its shareholders and Fortum real estate mortgages related to its conventional power plants.

As an additional precaution against unforeseen events, supplementary securities have to be given to the Ministry. The Ministy can demand up to 10% of the assessed liability as additional securities, and in practice applies this option up to the maximum.

Table 6 Base for decommissioning funds required for nuclear facilities in Finland

Short name of nuclear facility	Kind of facility: NPP = nuclear power plant RR = Research reactors Others: please specify	Please check if decommissioning funds are based on overnight / undiscounted decommissioning costs	Please check if decommissioning funds are based on net present value / discounted decommissioning costs	Discount rate used for discounting, if any	Reference date used for discounting	Remarks
OL 1+2 (TVO)	NPP	X				Detailed guidance on the funding system procedures to be followed is given in the Nuclear Energy Act and Decree and Government's decisions
Lo 1+2 (FPH)	NPP	X				
FiR 1 (VTT)	RR	X				

Table 7 Decommissioning funds accumulated in relation to expected costs of future liabilities for decommissioning of nuclear installations and waste management and final disposal in Finland (in prices of 2005)

Short name of nuclear facility	Kind of facility: NPP = nuclear power plant RR = Research reactors Others: please specify	Total decommissioning (#) costs estimated [Mio. Euro]	Fund holding at the end of 2005 [Mio. Euro]	Provisions accumulated in relation to future liabilities [%]	Years of operation until 31-12-2005 in relation to total expected lifetime [%]	Remarks
OL 1+2 (TVO)	NPP	In the Finnish funding system the costs apply only to future liabilities - not to total costs	826.6	100%	42%	The planned lifetime for the reactors in Olkiluoto is 60 years and for the reactors in Loviisa 50 years. The current operating licence of FiR 1 is valid until the end of 2011. No discounting is considered in cost estimates.
Lo 1+2 (FPH)	NPP		617.6	100%	50%	
FiR 1 (VTT)	RR		5.3	100%	88%	
TOTAL			**1 450**	100%		

(#) Includes waste management and disposal costs as well Sources: Proposals by TVO, FPH and VTT and the Decisions by the MTI on fund targets for them

Table 8 Management of decommissioning funds in Finland

Short name of nuclear facility	Kind of facility: NPP = nuclear power plant RR = Research reactors Others: please specify	Provisions accumulated by 31-12-2005 [Mio. Euro]	… of which has been accumulated within the own assets of the operator of the facility or its mother company [Mio. Euro]	… of which has been accumulated by the operator of the facility or its mother company within a separated account / segregated fund [Mio. Euro]	… of which has been accumulated in an external fund under public control [Mio. Euro]	… of which has been accumulated in an external fund under mixed private-public control [Mio. Euro]	Share of funds the operator of the facility can access for other activities until the funds are needed for their original decommissioning purpose [%]	Remarks
OL 1+2 (TVO)	NPP	826.6	-	-	826.6	-	75%	The remaining 25% can be borrowed by the State. Presently the fund holdings cover fully the future liabilities. In the future (2009) the share of the fund target of TVO for the new unit, Olkiluoto 3, will be covered initially mostly by securities
Lo 1+2 (FPH)	NPP	618.0	-	-	618.0	-	75%	
FiR 1 (VTT)	RR	5,3	-	-	5.3	-	not applicable	
Olkiluoto 3	NPP	0	-	-	0	-	-	

Sources: Proposals by TVO, FPH and VTT and the Decisions by the MTI on fund targets for them

Table 9 Investment of decommissioning funds until they are used for their original purpose

Short name of nuclear facility	Kind of facility: NPP = nuclear power plant RR = Research reactors Others: please specify	Provisions accumulated by 31-12-2005 [Mio. Euro]	… of which have been invested in secure state bonds [Mio. Euro]	… of which have been invested in other assets with fixed interest rates [Mio. Euro]	… of which have been lent to associated or joined companies or to third parties [Mio. Euro]	… of which have been invested in other means (shares, mergers & acquisitions, etc.) [Mio. Euro]	Interest on invested financial means from decommissioning funds in 2004 [%]	Interest on invested financial means from decommissioning funds in period 2000-2004 [%]	Remarks
OL 1+2 (TVO)	NPP	826.6	-	594.5	-	-	20.2 M Euro 2.7%		75% of the provisions in the fund have borrowed back to the operator and lent further to shareholders. 25% is borrowed by the State
Lo 1+2 (FPH)	NPP	618.0	-	≈ 450	-	-	15.0 M Euro 2.7%		

Source: Annual Report 2005 of the Board of the State Nuclear Waste Management Fund

4 Transparency of the funding schemes to the public

The Government's policy decision on the objectives and time schedule of management and disposal of spent fuel and operational waste and on the decommissioning of the nuclear power plants was made already in 1983. Hence the stepwise implementation of the nuclear waste management and decommissioning program has been reported frequently also in the public media. The Nuclear Energy Act was amended in 1994 and as a result the returning of spent fuel from the Loviisa plant to the Russian Federation was discontinued and all nuclear waste and spent fuel has to be disposed of in Finland. This amendment in practices followed was also discussed widely in the media.

In the connection of the environmental impact assessment (EIA) process and in the subsequent decision in principle process (DiP) for the political approval of the spent fuel disposal facility siting to Olkiluoto at the end 1990s, public hearings were arranged and the issues were discussed also in the media in the national level. Partly parallel, the corresponding EIA- and DiP-processes were conducted regarding the political approval of the building of the fifth reactor to Finland. In that connection also the responsibility of the applicant to cover the financial liabilities for future decommissioning and waste management and disposal measures became clear to the political decision-makers and the public.

The funding system is described in detail in the Nuclear Energy Act and Decree, In addition, in the 1990s the Ministry of Trade and Industry (MTI) prepared a specific brochure describing the tasks and responsibilities of the State Nuclear Waste Management Fund and the responsibilities of the licence holders to cover the future costs by payments to the Fund. Since that time only very short descriptions of the funding system have been published as part of the brochures describing generally the nuclear energy situation in Finland. The funding system and the waste management and decommissioning plans are described in detail in the national reports to the Joint Convention; the most recent reporting (STUK-B-YTO-243) took place in 2005. That report is placed on the website of STUK. Furthermore, each year the MTI issues a press release when the decisions are made by the ministry regarding the fund targets of each licence-holder for a particular calendar year. The press releases describe shortly the current situation of the fund (fund holding at the end of the previous year and returns of the investments by the Fund during the previous year).

The Act on Environmental Impact Assessment Procedure defines that it is obligatory to conduct this process for every decommissioning project of a nuclear facility (power reactors, the research reactor) and for planned new waste management and disposal facilities. Thereby the general public will be involved in decommissioning projects. However, there is no public participation in the routine functioning of the State Nuclear Waste Management Fund. The Annual Reports of the Fund are distributed only to the authorities and the licence-holders. In that respect the transparency of the funding system could be improved.

5 Stakeholder analysis

The Finnish stakeholders related to the decommissioning and waste management and disposal funding system and their responsibilities are the following:

- The power companies have presently the ultimate responsibility for planning, implementing and financing of all measures related to decommissioning and waste management and disposal. The power companies are going to perform the dismantling, decontamination and demolition of the nuclear power plants
- Posiva Oy performs various tasks on behalf of the power companies, such as preparing annually the cost estimates fort the future measures mentioned above and taking care of the disposal of all types of nuclear wastes
- The Radiation and Nuclear Safety Authority (STUK) is the safety authority that controls the planning and later implementation of the different measures mentioned above. In addition, STUK gives annually statements on the technical and safety feasibility to the Ministry of Trade and Industry (MTI) regarding the updated schemes and cost estimates for waste management and disposal and decommissioning of nuclear facilities by the licence-holders. MTI also asks statement from VTT Technical Research Centre of Finland regarding the cost estimates of the power companies.
- The Board of the State Nuclear Waste Management Fund has the responsibility to manage the Fund. It prepares annual report on this management. The annual report includes a balance sheet of the Fund and description on the annual returns of the fund holdings invested in the ways allowed by the Nuclear Energy Act.
- MTI is the ministry having the overall responsibility for the nuclear energy field in Finland. One of MTI's duties is to oversee the planning and implementation of decommissioning and waste management measures and the related funding system. MTI makes the decisions on the annual fund targets of the licence-holders.

The different stakeholders share the opinion that the division of responsibilities between the different stakeholders is clear and that a separate publicly-controlled funding system assures that the responsibilities of decommissioning and waste management and disposal are not shifted to the next generations without providing the financial means to cover the costs of future liabilities. Due to relatively long experience on applying the present funding system the stakeholders have established well functioning procedures to fulfil the requirements stated by the Nuclear Energy Act and Decree.

Harmonization of detailed systems/methods for funding employed in different member countries of EU is not considered necessary. It is however important to introduce general requirements on producers of nuclear energy to allocate appropriate means/ resources for future decommissioning and waste management and disposal activities to ensure a fair competitive market. In that respect the background reasons to objecting the proposed directives ("nuclear package") of the EU are not related to the

disagreement on the general principles of applying the polluter pays –principle but rather to the requirement of legally binding nature of the proposed directives.

6 Conclusions and recommendations

The present Funding system applied in Finland is functioning well and the external Fund under public control is considered to give a high degree of assurance that the funds will be available to cover the costs of future decommissioning and waste management and disposal measures when the implementation of the plans starts. The system based on undiscounted cost estimates gives additional assurance that the funds will be sufficient regardless of the amount of returns of the investments of fund holdings. In the future continued emphasis will, however, be paid on independent reviews to check the reliability of cost estimates by the licence-holders.

Harmonization of detailed systems/methods for funding employed in different member countries of EU is not considered necessary. The member states should also in the future have a freedom to apply their own, well-functioning, national systems and develop them taking into account their special circumstances provided that the systems fulfil certain important general principles to be agreed among the member countries.

The terminology proposed by the Commission – at least to be used in this report - suggests that *decommissioning* should be used in a very broad meaning covering not only the technical steps (dismantling, decontamination, demolition) but also all other activities related to the safe handling, processing, management, transport and disposal of spent fuel and nuclear wastes arising from the fuel cycle. This definition deviates from the commonly used vocabulary and may lead to difficulties in the interpretation in the national contexts. For example the requirements in Nuclear Energy Act and Decree regarding the funding of future liabilities uses *waste management* in broad meaning interpreting it to cover also decommissioning and thereby the need to cover the future costs of the decommissioning of nuclear power plants, which is specifically emphasized in the Nuclear Energy Act. It is worth noting that in the Commission's report (COM/2004/0719 final) a more specific formulation (decommissioning and waste management) is used in the statement "The Commission notes the importance of ensuring that funds established for the purpose of decommissioning and waste management activities, which relate to the objectives of the Euratom Treaty, are managed in a transparent way, and used only for the said purpose." To avoid problems in interpretation and in communication of the general principles for the funding systems a more comprehensive term "Decommissioning and Waste Management Funds" would be highly recommendable.

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Annexes

Annex I

Nuclear Energy Act (1987)

Sections of the Act concerning the funding system for future nuclear waste management costs.

Annex II

Nuclear Energy Decree (1988)

Sections of the Decree concerning the funding system for future nuclear waste management costs.

NB: Unofficial translation
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Nuclear Energy Act

990/1987; amendments up to 769/2004 included)

Chapter 1 - **Objectives and scope of application**

Section 1 - *Objectives*

To keep the use of nuclear energy in line with the overall good of society, and in particular to ensure that the use of nuclear energy is safe for man and the environment and does not promote the proliferation of nuclear weapons, this Act lays down general principles for the use of nuclear energy, the implementation of nuclear waste management, the licensing and control of the use of nuclear energy, and the competent authorities.

Section 2 - *Scope of application*

This Act applies to:

(1) the construction and operation of nuclear facilities;
(2) mining and enrichment operations aimed at producing uranium or thorium;
(3) the possession, manufacture, production, transfer, handling, use, storage, transport, export and import of nuclear material and nuclear waste as well as the export and import of ores and ore concentrates containing uranium or thorium;
(4) in the cases specified in the third subsection of this section,
  (a) the possession, manufacture, transfer, export and import of material
  (b) the possession, manufacture, assembly, transfer, export and import of devices and equipment, and
  (c) the possession, transfer, export and import of nuclear information; (738/2000)
(5) in cases to be provided by decree, the conclusion and execution of civil agreements, for implementation outside of Finland in regard to any of the activities referred to in paragraphs 1–4 with a foreign State, a foreign natural or legal person, should the agreement have pertinence to the proliferation of nuclear weapons or should the obligations under Finland's international treaties in the field of nuclear energy have bearing on the agreement; and (738/2000);
(6) in cases to be provided by Government decree, nuclear fuel cycle related research and development activities determined in Article 18(a) of the Additional Protocol (53/2004) to the agreement made on implementation of Article III(1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons (738/2000)

It may be laid down by decree that some parts of the provisions of this Act shall not apply to activities referred to in paragraphs 1–3 and 5 of subsection 1, should those activities have little significance to the objectives of this Act.

In cases where the materials, devices, equipment or nuclear information referred to hereunder have pertinence to the proliferation of nuclear weapons or have bearing on Finland's international treaties in the nuclear energy sector, the application of this Act may be extended by decree, to:

(1) non-nuclear material, in cases where their properties are particularly suited for obtaining nuclear energy;
(2) devices and equipment intended or particularly suited for use in nuclear facilities;

(3) devices and equipment intended or particularly suited for use in the manufacture of nuclear material or material referred to in paragraph 1;
(4) special equipment essential to the manufacture of devices or equipment referred to in paragraphs 2 and 3; and
(5) nuclear information that is in written or other physical form and is not generally available.

Section 3 – *Definitions*

For the purposes of this Act:

(1) *use of nuclear energy* means operations specified in section 2(1);
(2) *nuclear material* means special fissionable materials and source materials, such as uranium, thorium and plutonium, suited for obtaining nuclear energy;
(3) *nuclear waste* means:
(a) radioactive waste in the form of spent nuclear fuel or in some other form, generated in connection with or as a result of the use of nuclear energy; and
(b) materials, objects and structures which, having become radioactive in connection with or as a result of the use of nuclear energy and having been removed from use, require special measures because of the danger arising from their radioactivity; (1420/1994)
(4) *nuclear waste management* means all measures necessary to recover, store and handle nuclear waste and permanently dispose of them (final disposal);
(5) *nuclear facility* means facilities necessary for generating nuclear energy, including research reactors, facilities performing extensive final disposal of nuclear waste, and facilities used for extensive manufacture, production, use, handling or storage of nuclear material or nuclear waste; nuclear facility, however, shall not refer to:
(a) mines or enrichment plants intended for the manufacture of uranium or thorium, or the premises and places, including their precincts, where the nuclear wastes derived from such facilities are stored or emplaced for disposal; or to
(b) premises permanently shut down which contain nuclear waste, enclosed there in a manner approved as permanent by the Radiation and Nuclear Safety Authority (STUK);
(6) *physical protection* means the measures needed to protect the use of nuclear energy against illegal activities in the nuclear facility, its precincts, other places or vehicles where nuclear energy is used; (1420/1994)
(7) *emergency planning* means the measures needed to limit nuclear damage at the nuclear facility, in its precincts, in other places or in vehicles where nuclear energy is used; and (1420/1994)
(8) *Euratom Treaty* means the Treaty establishing the European Atomic Energy Community (EURATOM), done at Rome, on 25 March 1957, in the form it binds Finland by virtue of the Treaty of Accession of Finland. (1420/1994)

Chapter 2 - **General Principles**

Section 4 - *Nuclear explosives*

Import of nuclear explosives as well as their manufacture, possession and detonation in Finland are prohibited.

Section 5 - *Overall good of society*

The use of nuclear energy, taking into account its various effects, shall be in line with the overall good of society.

Section 6 – *Safety*

The use of nuclear energy must be safe; it shall not cause injury to people, or damage to the environment or property.

Section 6 a - *Management of nuclear waste generated in Finland* (1420/1994)

Nuclear waste generated in connection with or as a result of use of nuclear energy in Finland shall be handled, stored and permanently disposed of in Finland.

The above provisions shall not, in cases to be laid down by decree, apply to:

(1) small amounts of nuclear waste which will be, or have been, delivered abroad for research purposes, or;
(2) nuclear waste that has been generated in connection with or as a result of the operation of a research reactor in Finland.

Section 6 b - *Provisions concerning nuclear waste not generated in Finland* (1420/1994)

Nuclear waste generated in connection with or as a result of the use of nuclear energy elsewhere than in Finland, shall not be handled, stored or permanently disposed of in Finland.

The above provisions shall not, in cases to be laid down by decree, apply to:

(1) small amounts of nuclear waste which will be or, have been, delivered to Finland for research purposes; or
(2) nuclear waste of unknown origin referred to in section 80(1).

Section 7 - *Physical protection and emergency planning and other comparable arrangements*

Sufficient physical protection and emergency planning as well as other arrangements for limiting nuclear damage and for protecting nuclear energy against illegal activities shall be a prerequisite for the use of nuclear energy.

Chapter 3 - **Obligations arising from activities requiring licensing**

Section 8 - *Obligation to apply for a licence*

The use of nuclear energy without the licence provided by this Act is prohibited.

A licence is not, however, needed for research and development activities referred to in paragraph 6 of section 2(1). Instead of applying for a licence, the operator shall annually submit a notification, to be defined in more detail by decree, to the Radiation and Nuclear Safety Authority (STUK). (738/2000)

On request, the Ministry of Trade and Industry must give a binding advance ruling as to whether the intended activity requires that a licence be applied for.

Section 9 - *Licensee's obligations*

It shall be the licensee's obligation to assure safe use of nuclear energy.

It shall be the licensee's obligation to assure such physical protection and emergency planning and other arrangements, necessary to ensure limitation of nuclear damage, which do not rest with the authorities.

A licensee whose operations generate or have generated nuclear waste (*licensee under a waste management obligation*) shall be responsible for all nuclear waste management measures and their appropriate preparation, as well as for their costs (*waste management obligation*).

Section 10 - *Continuation of obligations*

Cancellation of a licence or expiration of its validity shall not exempt the licensee, or one who has had a licence, from compliance with the provisions of section 9 and chapters 6 and 7, or the provisions laid down by virtue of them, or the licence conditions.

Chapter 4 - **Government decision-in-principle**

Section 11 – *Decision-in-principle*

Construction of a nuclear facility of considerable general significance shall require a Government decision-in-principle on that the construction project is in line with the overall good of society.

Of the nuclear facilities referred to in section 3(5), those of considerable general significance are:

(1) facilities operated for the generation of nuclear energy having a thermal power higher than 50 megawatts;
(2) facilities serving as repositories for nuclear waste; and
(3) facilities operated for purposes other than the generation of nuclear energy having, at a given moment, an amount of nuclear material or waste or involving a radiation risk, as defined by decree, that shall be deemed comparable with nuclear facilities as defined in paragraph 1.

Section 12 - *Application for a decision-in-principle and the required documentation*

A decision-in-principle is applied for by submitting an application to the Government, on which the Ministry of Trade and Industry must obtain a preliminary safety assessment from the Radiation and Nuclear Safety Authority (STUK) and a statement from the Ministry of the Environment as well as from the municipal council of the municipality intended to be the site of the facility and from its neighbouring municipalities.

Section 13 - *Public hearing*

Before the decision-in-principle is made, the applicant shall compile according to instructions by the Ministry of Trade and Industry an overall description of the facility, the environmental effects it is expected to have and its safety, and make it generally available to the public after a check by the Ministry.

The Ministry of Trade and Industry shall provide residents and municipalities in the immediate vicinity of the nuclear facility as well as local authorities an opportunity to present their opinions in writing before the decision-in-principle is made. Furthermore, in a way the Ministry may specify in more detail, the Ministry shall arrange a public hearing in the municipality where the planned site of the facility is located and during this hearing the public shall have the opportunity to give their opinions either orally or in writing. Opinions that have been presented shall be made known to the Government.

Section 14 - *Consideration of the decision-in-principle by the Government*

Before making the decision-in-principle referred to in section 11, the Government shall ascertain that the municipality where the nuclear facility is planned to be located in its statement referred to in section 12, is in favour of the facility and that no facts indicating a lack of sufficient prerequisites

Section 18 - *Construction of a nuclear facility having considerable general significance*

A licence to construct a nuclear facility referred to in section 11 may be granted:

(1) if a decision-in-principle referred to in section 11 has deemed the construction of a nuclear facility to be in line with the overall good of society, and Parliament has decided that the decision-in-principle remains in force; and
(2) if the construction of a nuclear facility also meets the prerequisites for granting a construction licence for a nuclear facility as provided in section 19.

Section 19 - *Construction of other nuclear facilities*

A licence to construct a nuclear facility other than that referred to in section 18 can be granted:

(1) if plans concerning the nuclear facility, its central operational systems and components entail sufficient safety and protection of workers, and the population's safety has otherwise been taken into account appropriately when planning operations;
(2) if the location of the nuclear facility is appropriate with respect to the safety of the planned operations and environmental protection has been taken into account appropriately when planning operations;
(3) if physical protection has been taken into account appropriately when planning operations;
(4) if a site has been reserved for constructing a nuclear facility in a town plan or building plan in accordance with the Building Act (370/58), and the applicant has possession of the site required for the operation of the facility;
(5) if the methods available to the applicant for arranging nuclear waste management, including the final disposal of nuclear waste and the decommissioning of the facility, are sufficient and appropriate;
(6) if the applicant's plans for arranging nuclear fuel management are sufficient and appropriate;
(7) if the applicant's arrangements for the implementation of control by the Radiation and Nuclear Safety Authority (STUK) as referred to in paragraph 3 of section 63(1), in Finland and abroad, and for the implementation of control, as referred to in paragraph 4 of section 63(1), are sufficient;
(8) if the applicant has the necessary expertise available;
(9) if the applicant has sufficient financial prerequisites to implement the project and carry on operations; further
(10) if the applicant is otherwise considered to have the prerequisites to engage in operations safely and in accordance with Finland's international contractual obligations;

and the planned nuclear facility otherwise fulfils the principles laid down in sections 5–7.

Section 20 - *Operation of a nuclear facility*

The licence to operate a nuclear facility may be issued as soon as a licence has been granted to construct it and if:

(1) the operation of the nuclear facility has been arranged so that the protection of workers, the population's safety and environmental protection have been taken into account appropriately;
(2) the methods available to the applicant for arranging nuclear waste management, including final disposal of nuclear waste and decommissioning of the facility, are sufficient and appropriate;
(3) the applicant has sufficient expertise available and, in particular, the competence of the operating staff and the operating organisation of the nuclear facility are appropriate;
(4) the applicant is otherwise considered to have the financial and other prerequisites to engage in operations safely and in accordance with Finland's international contractual obligations; and

The decision shall be delivered to those parties that have separately requested for the decision.

Section 26 - *Licence cancellation*

The authority that has granted a licence must cancel it wholly or partly, if implementation of the general principles for the use of nuclear energy as laid down in this Act is essentially endangered, for instance, as a consequence of:

(1) the licensee violating the licence conditions or regulations issued by an authority by virtue of this Act;
(2) the licensee omitting to fulfil the financial provision obligation referred to in chapter 7 of this Act, or to observe the Nuclear Liability Act (484/1972) in a manner referred to in section 41 of that Act; or
(3) the licensee dying or losing legal capacity or the corporation or foundation holding the licence being dissolved, otherwise discontinuing operations or going into bankruptcy.

Cancellation of a licence requires that a reasonable period of time has been allowed for the licensee to correct the deficiency, when possible by means of the licensee's actions.

When cancelling a licence, the same procedure shall be followed, as appropriate, as when the licence was granted.

Section 27 – *Compensation*

If a licence to construct or operate a nuclear facility is cancelled or a licence to operate a nuclear facility is denied, the holder of the cancelled licence or the applicant whose licence to operate the nuclear facility has been denied, is entitled to a reasonable amount of compensation from the State of Finland for the direct expenses incurred in the construction of the facility.

Compensation shall not be paid, however, if the licence is cancelled because sections 6 or 7 can no longer be observed in operating the facility, or because the licensee has acted contrary to this Act or the regulations under it, or for reasons referred to in paragraphs 2 or 3 of section 26(1). Nor shall compensation be paid if the licence to operate the nuclear facility has been denied because the nuclear facility and its operation do not meet the principles laid down in sections 6 and 7 or the prerequisites set in paragraph 4 of section 20(1).

The Ministry of Trade and Industry and whoever is entitled to compensation shall try to reach an agreement on the amount of the compensation. The text of the agreement shall be sent to the Government for ratification.

Should an agreement on compensation not be reached, a suit for compensation must be filed as provided [in the Act on the venue of certain administrative issues (446/1954)[1]], within two years following the decision on which the suit for compensation is based has become legally valid. If compensation is not applied for within the time specified, the right to compensation shall be extinguished.

Chapter 6 - **Nuclear waste management**

Section 28 - Decision on implementation of a waste management obligation

The Ministry of Trade and Industry or the Radiation and Nuclear Safety Authority (STUK), having granted a licence for operations generating nuclear waste, shall decide, having consulted, if

[1] Act 446/1954 has been repealed by amendment 242/1989 to Provincial Administrative Court law.

necessary, the Ministry of the Environment in the matter, the principles on the basis of which the waste management obligation referred to in section 9(3) is to be implemented. For this purpose the Ministry of Trade and Industry or STUK may obligate the licensee under the waste management obligation to present a plan for carrying out nuclear waste management.

Section 29 - *Mandatory waste management co-operation*

The Ministry of Trade and Industry may order various licensees under the waste management obligation to undertake waste management measures jointly, if by doing so safety can be increased or costs can be substantially reduced or if any other weighty reason so requires. At the same time, provisions shall be laid down, if necessary, on the distribution of the costs incurred due to the measures to be carried out jointly.

Section 30 - *Transfer of waste management obligation*

When the possession of a nuclear facility, a mine or an enrichment plant intended for the production of uranium or thorium, or nuclear waste is transferred to another party, the Ministry of Trade and Industry may, on request, completely or partially transfer the waste management obligation from the transferor to the transferee, if the transfer of the obligation does not endanger the carrying out of nuclear waste management.

Section 31 - *Transfer of nuclear waste to the State*

If the Ministry of Trade and Industry considers that a licensee under a waste management obligation has substantially failed to observe the confirmed time-schedules for nuclear waste management of the nuclear waste he has generated or has otherwise violated the authorities' regulations for the implementation of nuclear waste management, the Ministry shall bring the matter to the Government to decide whether the licensee's actions mentioned above, judged on the whole, give good reason to conclude that nuclear waste management completely or in part cannot be carried out by the licensee. If the Government finds that nuclear waste management completely or in part cannot be carried out by the licensee, the Government shall order that such nuclear waste be transferred to the State, or to a domestic corporation under the control of the State, for the implementation of the nuclear waste management measures still required.

The Government shall order that the nuclear waste generated by the licensee under a waste management obligation be transferred to the State or to a corporation referred to in subsection 1, for the implementation of the nuclear waste management measures still required also in cases where the Government finds that, despite an order made under section 65(2), the licensee under a waste management obligation has not fulfilled the financial provision obligation laid down hereunder. Notwithstanding the provisions above in this subsection, the Government may not order the transfer of the nuclear waste insofar as making such an order would place the State in a disadvantageous financial position with respect to meeting the purpose of financial provision measures.

Section 32 - *Expiry of waste management obligation*

The Ministry of Trade and Industry or the Radiation and Nuclear Safety Authority (STUK), having granted a licence for operations that generate nuclear waste, shall order that the waste management obligation has expired when:

(1) it has been transferred to another party in accordance with section 30; or
(2) the nuclear waste has been transferred outside Finland's jurisdiction in the approved permanent manner referred to in section 6 a(2); or (1420/1994)
(3) the final disposal of nuclear waste has been carried out in accordance with section 33, and the licensee under a waste management obligation has paid a lump sum to the State for the

monitoring and control of the nuclear waste.

Should the Government issue an order referred to in section 31, the State shall be responsible thereafter for the nuclear waste management measures not yet carried out for the waste referred to in the order, and for the costs to be incurred in carrying out these measures by the licensee under a waste management obligation.

Section 33 – *Final disposal*

Final disposal is considered implemented when the Radiation and Nuclear Safety Authority (STUK) has confirmed the nuclear waste to be permanently disposed of in a manner has approved.

Section 34 - *Responsibility for nuclear waste after their final disposal*

When the licensee's waste management obligation has ceased by virtue of paragraph 3 of section 32(1), the ownership right to the nuclear waste is transferred to the State, which shall be responsible thereafter for the nuclear waste.

Should it become necessary after the final disposal, the State has the right, at the disposal site, to take all measures required for the monitoring and control of the nuclear waste and for ensuring the safety of the repository.

Chapter 7 - **Financial provision for the cost of nuclear waste management**

Section 35 - Financial provision obligation

The licensee under a waste management obligation, in the manner laid down below in this chapter, shall make financial provision for the costs referred to in section 9(3).

In applying the provisions of this chapter, nuclear waste shall be considered to include also such materials, objects and structures referred to in section 3(3b) that have not yet been taken out of use
.
The costs of nuclear waste management as referred to in this chapter may also be considered to include the charges incurred in nuclear waste management as referred to in section 77.

Section 36 - *Financial provision measures*

The licensee under a waste management obligation shall fulfil the financial provision obligation by payment for each calendar year of the charges referred to below into the National Nuclear Waste Management Fund, and shall furnish the State with the securities laid down below as a precaution against insolvency.

Section 37 – *Definitions*

For the purposes of this chapter:

(1) *assessed liability* means the assessed amount of costs to be incurred in the future from managing the nuclear waste generated by the licensee under a waste management obligation;
(2) *fund target* means the amount that the fund holding of the licensee under a waste management obligation shall reach in each calendar year;
(3) *fund holding* means the amount that the National Nuclear Waste Management Fund confirms the licensee under a waste management obligation to have in the Fund at a given time;
(4) *fund contribution* means the fee, to be fixed annually, which the licensee under a waste management obligation must pay into the National Nuclear Waste Management Fund in order to

raise the fund holding to the amount of the fund target;
(5) *required share* means the amount that the actual share of the licensee under a waste management obligation shall reach in each calendar year in order to cover the future costs of nuclear waste management, which the licensee under a waste management obligation has been ordered, subject to section 31, to transfer to the State;
(6) *actual share* means the amount which the National Nuclear Waste Management Fund at a given time confirms to have been set aside in the Fund to be used for the management of the nuclear waste which a licensee under a waste management obligation has been ordered to transfer to the State; and
(7) *profit or loss of the Fund* means the amount by which the total sum of the National Nuclear Waste Management Fund's income from interest and compensation received from funds held by the State exceeds or falls short of the costs and credit losses incurred in the National Nuclear Waste Management Fund's administration and capital management.

Section 38 - *National Nuclear Waste Management Fund*

For purposes of implementing the financial provision, there shall be a National Nuclear Waste Management Fund, independent of the State budget but controlled and administered by the Ministry of Trade and Industry.

In addition to the tasks laid down under subsection 1 above, the National Nuclear Waste Management Fund is to collect the fees determined subject to chapter 7 a and to allocate the funds thus collected. (1131/2003)

The National Nuclear Waste Management Fund shall have a Board of Directors, appointed by the Government for three calendar years at a time. The tasks and administration of the National Nuclear Waste Management Fund shall be defined more precisely by decree.

Section 39 - *Estimation of the assessed liability*

Estimation of the assessed liability shall be based on those basic nuclear waste management decisions, meeting the general principles of chapter 2, that on the basis of knowledge available at the time of the estimation can be considered to enable the carrying out of nuclear waste management as necessary and in due time.

The assessed liability is estimated on the basis of the price and cost levels prevailing at the time for which the assessed liability is confirmed. Sources of information about prices and costs which can be considered to be reliable shall be used in making the estimation. The uncertainty of available information about prices and costs shall be taken into account, to a reasonable extent, as raising the assessed liability.

Estimation of the assessed liability shall be based on decisions, price information and price estimates presented by a licensee under a waste management obligation as far as they meet the prerequisites laid down in subsections 1 and 2.

Section 40 - *Amount of the Fund target*

The Fund target for each calendar year shall be equal to the assessed liability at the end of the previous calendar year. To distribute the costs of nuclear waste management evenly among the operating years of a nuclear facility, however, the Fund target shall be less than the assessed liability when the prerequisites laid down in subsection 2 or 3 have been met. (1078/1996)

When the nature of operations of a nuclear facility is such that a considerable proportion of its nuclear waste management costs is made up of costs that do not depend on the amount of nuclear waste, the Fund target of the nuclear facility in its various years of operation shall be the specified

share of the assessed liability of the nuclear facility falling upon the licensee under a waste management obligation. The ratio of the Fund target to this assessed liability shall be increased gradually, so that the fund target shall reach the assessed liability in sufficient time before it is estimated that the nuclear facility will cease operations.

If the assessed liability as per end of a calendar year significantly deviates from the assessed liability estimated for the same calendar year, as confirmed according to section 44(1), the change in the assessed liability can be partly ignored when the Fund target is confirmed for the two years following the calendar year in question. (1078/1996)

Section 41 - *Fund holding of the licensee under a waste management obligation*

The fund holding shall include:

(1) the most recently confirmed fund holding of the licensee under a waste management obligation;
(2) the fund contribution received by the Fund from the licensee under a waste management obligation after the last confirmed fund holding, and any additional fund contribution referred to in section 44(4); and
(3) any amount notified by the Ministry of Trade and Industry on the basis of section 43(3) after the last confirmed fund holding.

The fund holding is obtained by subtracting the following from the amount referred to in subsection 1:
(1) any surplus which the licensee under a waste management obligation has received from the Fund since confirmation of the last fund holding; and
(2) the amount transferred from the last confirmed fund holding of the licensee under a waste management obligation to the actual share, and after the last confirmed fund holding, the amount notified by the Ministry of Trade and Industry on the basis of section 43(3).

The fund holding on the last day of December of each year is obtained by adding the share of the Fund's profit to which the licensee under a waste management obligation is entitled, to the fund holding referred to in subsections 1 and 2, or by subtracting from the said fund holding the share of the Fund's loss which the licensee under a waste management obligation shall bear.

Section 42 - *Fund contribution and surplus*

The licensee under a waste management obligation shall pay a fund contribution to the National Nuclear Waste Management Fund so that the fund holding on the last day of March is equal to the fund target for the current calendar year.

Should the fund target for the calendar year be lower than the fund holding on the last day of December the previous year, the licensee under a waste management obligation shall be refunded with the said surplus no later than on the first working day in April of the same calendar year. The receivable the Fund has from the licensee under a waste management obligation may be used to sign off the surplus as refunded according to the terms and conditions of the loan granted to the licensee. (1078/1996)

Section 43 - *Confirming the assessed liability and the fund target*

The Government shall issue general provisions on how the expenses referred to in section 35 are to be taken into consideration in the estimation of the assessed liability, as well as on the procedure to be followed in calculating the fund target in cases referred to in section 40(2-3), as well as on other principles of the financial provision. (1078/1996)

The Ministry of Trade and Industry shall, at the beginning of the calendar year, confirm the assessed liability of each licensee under a waste management obligation as at the end of the previous calendar year and the fund target for the current calendar year.

The Ministry of Trade and Industry shall confirm the changes arising from the transfer of the waste management obligation as referred to in section 30 and affecting the assessed liability and the fund targets of the concerned licensee under a waste management obligation, observing the provisions of section 40 to the extent applicable, as well as the amount to be transferred from the fund holding of the licensee to the fund holding of the transferee as referred to in section 30.

Section 44 - *Security arrangements*

The licensee under a waste management obligation shall supply the State with securities fulfilling the conditions laid down in section 45, prior to the commencement of the waste generating operation and otherwise always by the end of June, so that the total securities held at that time by the State are equal to the difference between the separately determined assessed liability at the end of the current calendar year and the Fund target of the current calendar year. The decision on the assessed liability to be determined in this way shall be taken by the Ministry of Trade and Industry.

Should there be a major change in the principles on which determination of the assessed liability is based, the Ministry of Trade and Industry may reassess the assessed liability. Should the reassessed liability be higher than the previous assessed liability, the State must be provided with the required supplementary securities within three months from the confirmation of the assessed liability.

In a case of unforeseen nuclear waste management expenses, the Government is to lay down an increase in the amount of the securities to be provided to the State as provided in this section. The amount of the securities may be increased by a maximum amount equalling 10 per cent of the assessed liability of the licensee under a waste management obligation determined in accordance with this section.

Should the licensee under a waste management obligation fail to provide the State with securities for the amount laid down in this section, the licensee shall pay the National Nuclear Waste Management Fund an additional fund contribution corresponding to the outstanding amount by the deadline specified in this section.

Section 45 – *Securities*

As security the Ministry of Trade and Industry may accept only:

(1) credit insurance provided by an insurance company as referred to in section 1 of the Insurance Companies Act (1062/79);
(2) direct liability guarantee provided by a Finnish savings bank; or (396/2000)
(3) such real estate mortgage or direct liability guarantee by a Finnish corporation as has been accepted by the Government as corresponding in reliability to the security referred to in paragraph 1 or 2.

A security with a validity period of less than five years cannot be accepted.

Section 46 - *Temporary decrease in the Fund target*

For a special reason the Government may allow the fund target to be assessed lower than required by the provisions in section 40 for a period of a maximum of five years at a time.

Section 47 - *Required share and the Government claim*

Should the Government issue an order referred to in section 31, concerning the transfer of nuclear waste to the State, the Government shall confirm the assessed liability corresponding to the nuclear waste management expenses of the nuclear waste ordered to be transferred, as well as the assessed liability corresponding to the nuclear waste management expenses of nuclear waste generated by the licensee under a waste management obligation to which the order does not apply.

In the same connection, the Government shall also confirm the required share resulting from the nuclear waste to be transferred, which is obtained by increasing the assessed liability corresponding to such nuclear waste by the amount laid down in section 44(3).

After the Government has confirmed the required share, a claim by the State is established against the licensee under a waste management obligation, the amount of which corresponds to the required share and which fall payable upon demand.

Section 48 - *Meeting the Government claim; actual share*

When the Government claim has been fixed, it shall primarily be met by separating from the Fund holding of the licensee under a waste management obligation such proportion of the Fund holding as corresponds to the proportion of the Fund holding corresponding to the transferred nuclear waste, of the total amount of the Fund holdings as referred to in section 47(1), to form the actual share in the National Nuclear Waste Management Fund. The licensee under a waste management obligation shall pay the rest of the Government claim to the Fund, to be added to the Fund holding within three months of the establishment of the Government claim.

Insofar as the licensee under a waste management obligation fails to pay the outstanding claim as referred to in subsection 1 within the time specified, a corresponding amount of the securities provided to the State pursuant to section 44 must be converted into money, which shall be added to the actual share. Should the insurance company or bank referred to in paragraph 1 or 2 of section 45(1), which granted such a security so require, the Fund shall lend the money obtained from the securities for a fixed period to the insurance company or bank, at an interest rate referred to in section 52(3), against a promissory note given by it to the fund, and on such other condition as the Fund may lay down, should the Ministry of Trade and Industry consider such an undertaking to ensure that the funds will be available.

Section 49 - *Supplementing the actual share*

After the required share has been confirmed for the first time in the way provided in section 47, the Ministry of Trade and Industry shall reconfirm it annually, observing the provisions on assessed liability and required share in section 43(2) and section 47(2).

The licensee under a waste management obligation shall pay fees annually to the National Nuclear Waste Management Fund, to be added to the relevant actual share in such a way that the amount of the actual share shall correspond to the amount of the required share within three months from the confirmation of the same.

Section 50 - *Use of the actual share*

Should the actual share exceed the required share of the ongoing calendar year, separately assessed by the Ministry of Trade and Industry as per the last day of the year, the balance between the actual share and the required share shall be available for compensating the State for any expenses arising from nuclear waste management measures regarding waste transferred to the State under section 31, including any annual interest calculated from the date of the costs, the

rate of which is fixed in section 52(3).

Should the balance referred to in subsection 1 not be sufficient to pay the said compensation and interest, the licensee under a waste management obligation is to pay the outstanding amount to the State within one month of the date of demand.

Should the actual share, after the procedure referred to in subsection 1, exceed the separately assessed required share referred to in subsection 1 by more than 20 per cent, the amount corresponding to this excess amount shall be refunded to the licensee.

Section 51 - *Profit and loss of the National Nuclear Waste Management Fund* (1078/1996)

The profit by the National Nuclear Waste Management Fund for a calendar year shall be added to credit and its loss be subtracted from, the Fund holdings and actual shares as on the last day of December in the same proportion as the corresponding Fund holdings and actual shares have constituted the capital of the Fund during the calendar year. When calculating the ratios, the interest which has accumulated during the preceding years on the loans granted from the Fund to the licensee in question and which, at any given time, has not yet been paid will be subtracted from the Fund holding or actual shares at any given time.

Section 52 - *Capital of the National Nuclear Waste Management Fund*

The licensee under a waste management obligation is entitled to receive a loan against full securities for a fixed period from the National Nuclear Waste Management Fund. The amount borrowed from the Fund must not, however, exceed 75 per cent of the Fund holding last confirmed for the said licensee under a waste management obligation. The shareholders of the licensee shall have the right to use the above-mentioned right of the licensee to the extent not used by the licensee himself. The amount to be lent from the Fund to the shareholders at any given time must be lent to the shareholders requesting it in proportion to their shareholding, as specified by the Fund in greater detail, if necessary.

Any amount of Fund capital which has not been lent pursuant to section 48(1) or (2) shall be available to the State and can be transferred through the State budget from the Fund to the State finances for a fixed period. If capital has been transferred to the State finances, an appropriation must be included annually in the budget for returning the capital to the Fund during the year in question, and for paying the Fund compensation, the amount of which corresponds to the interest rate fixed in subsection 4 for the period that the capital was allocated in the State finances. (1078/1996)

The State is entitled to borrow for a fixed period of time from the Fund capital an amount which, by virtue of section 48(1) or (2), has not been granted as a loan or which has not been transferred to State finances by virtue of subsection 2. The State shall partially pay the granted loan by the end of the calendar month following the request for payment every time the request is made by the Fund to refund the licensee under a waste management obligation with the confirmed surplus. (1078/1996)

When capital is lent from the Fund pursuant to subsection 1 or 3, the loan interest shall be tied to a commonly quoted market interest. The Government separately decides to what market interest the loans are tied. If necessary to ensure preservation of the value of the Fund capital and to secure the return it yields, the Government may decide that a special interest margin is added to the market interest applied. (1077/1998)

In case the Fund capital remains unused in the manner provided in subsections 1 to 3, the Fund shall invest such capital against full securities in some other way yielding the best possible return. (1078/1996)

On the recommendation of the appropriate ministry, the Government decides the general terms and conditions of loans granted to the licensee under a waste management obligation. The same terms and conditions, to the extent applicable, also apply to loans granted by virtue of subsection 3. (1078/1996)

Section 53 - *Limitations of returning securities and surplus*

Should it be discovered at the time when the assessed liability in end of the previous calendar year is confirmed that more securities have been supplied by the licensee under a waste management obligation to the State than required by the said assessed liability, the excess amount shall be returned to the licensee by the end of June of the current calendar year, provided that the licensee has fulfilled his obligations concerning the payments referred to in this chapter.

Subsection 2 has been repealed.

Chapter 7 a – **Ensuring availability of expertise** (1131/2003)

Section 53 a – *Fee collected from a nuclear facility operator* (1131/2003)

To meet the general principle laid down in section 5 above, whoever

(1) has a licence to operate a nuclear facility of considerable general significance referred to in paragraph 1 of section 11(2) of this Act;
(2) has a licence to construct such a nuclear facility, but who has not yet a licence to operate the facility, or;
(3) has submitted an application on the basis of which the Government has made a decision-in-principle on such a nuclear facility, which is in force, but no licence based on it for construction of the facility has not been granted,

shall be obliged to participate in financing research aimed at ensuring that, should such new factors concerning safe operation of nuclear facilities emerge that could not be foreseen, the authorities have such sufficient and comprehensive nuclear engineering expertise and other facilities at their disposal that can be used, when necessary, to analyse without delay the significance of such factors.

The obligation laid down in subsection 1 above shall be fulfilled by paying annually a fee into the National Nuclear Waste Management Fund, amounting to EUR 220 for each rated thermal output Megawatt given in the licence or for the highest thermal output Megawatt laid down in the decision-in-principle, or if a construction licence has been applied for by virtue of the decision-in-principle, for the rated thermal output Megawatt given in the licence application. This euro amount may also be fixed to be lower by Government decree.

Fees collected in accordance with subsection 2 above shall be kept apart from the other funds of the National Nuclear Waste Management Fund.

Section 53 b – *Fee to be collected from an operator under the waste management obligation* (1131/2003)

To meet the general principle laid down in section 5 above, any operator for whom an assessed liability has been fixed subject to section 43(2) of this Act shall be obliged to participate in financing research aimed at ensuring that the authorities have such sufficient and comprehensive nuclear engineering expertise and other facilities at their disposal that are needed for comparisons of the various ways and methods of carrying out nuclear waste management.

The obligation laid down in subsection 1 above shall be fulfilled by paying annually a fee into the National Nuclear Waste Management Fund, amounting to 0.08 per cent of the assessed liability fixed subject to section 43(2). This euro amount may also be fixed to be lower by Government decree.

Fees collected in accordance with subsection 2 above shall be kept apart from the other funds of the National Nuclear Waste Management Fund.

Section 53 c – *Separate funds* (1131/2003)

The two separate funds formed in accordance with sections 53 a and 53 b above are reduced by:

(1) the assets on the allocation of which from the separate funds concerned a decision has been made and that have been paid out;
(2) the funds paid back to persons liable for payment subject to section 53 e(4);
(3) costs arising from the deposit, management and administration of the separate funds concerned; and
(4) costs incurred by the drafting of financing decisions for research projects as well as by management and administration of projects.

The two separate funds formed in accordance with sections 53 a and 53 b above are accrued, besides the fees, by:

(1) incidental returns on the separate funds concerned; and
(2) the funds allocated for financing research projects that the Fund has decided to reclaim.

The separate funds can be allocated for financing research insofar as they are not tied by decisions concerning financing of research projects referred to under section 53 d(1) and as they do not include receivables for the Fund.

Section 53 d – *Financing of research projects* (1131/2003)

The National Waste Management Fund finances research projects by funds available for allocation each year so that:

(1) the whole of the project to be financed by the separate funds referred in section 53 a(3) supports in an appropriate manner the purpose of research subject to section 53 a(1);
(2) the whole of the project to be financed by the separate funds referred in section 53 b(3) supports in an appropriate manner the purpose of research subject to section 53 b(1).

The research projects referred to in paragraphs 1 and 2 of subsection 1 above shall be of high scientific standard and their results shall be publishable and the usability of the results shall not be restricted to the nuclear facilities of one licensee only.

Section 53 e – *Applying for, granting and collecting of research funding (1131/2003)*

The Ministry of Trade and Industry makes a proposal to the Fund for allocation of the funds referred to in section 53 d(1) above for financing of the projects. Before making its proposal, the Ministry shall first request a statement on it from the Radiation and Nuclear Safety Authority (STUK) and the Advisory Committee referred to in section 56(1).

Research financing is granted upon application. The application shall be addressed to the Ministry of Trade and Industry. The provisions of the Act on Discretionary Government Transfers (688/2001) shall also be applied to the procedure of applying for and granting research financing.

NB: Unofficial translation

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Nuclear Energy Decree

(161/1988; amendments up to 430/2004 included)

Chapter 1 – **Definitions**

Section 1

For the purposes of this Decree:

(1) *natural uranium* means uranium in which the abundance ratios of isotopes have not been changed from what they are in uranium found in nature;
(2) *enriched uranium* means uranium in which the ratio of those uranium atoms with an atomic weight of 235 or 233 to all atoms (enrichment factor) is higher than in natural uranium;
(3) *depleted uranium* means uranium in which the enrichment factor is lower than that of natural uranium;
(4) *effective kilogram* means a special unit used in safeguarding nuclear material and other fissile material; the quantity of material in effective kilograms is obtained by taking the mass of the material as kilograms and multiplying this:
(a) by 1, if the material is plutonium and uranium-233 isotope;
(b) by the square of its enrichment factor, if the material is uranium with a uranium-235 enrichment factor of 0.01 (1%) or above;
(c) by 0.0001, if the material is uranium with a uranium-235 enrichment factor below 0.01 (1%) but above 0.005 (0.5%);
(d) by 0.00005, if the material is depleted uranium with a uranium-235 enrichment factor of 0.005 (0.5%) or below;
(e) by 0.00005, if the material is thorium. (430/2004);
(5) *particular safeguards obligation* means such an obligation arising from a bilateral agreement in the nuclear field concluded by Finland or by the European Union with some other State or a group of States which concerns possession, manufacture, production, transfer, handling, use, storage, transport, export or import of nuclear material, nuclear waste, ore, or ore concentrate subject to the agreement, or of some other material, device, equipment or information as referred to in section 8(1). (473/1996)
(6) *nuclear fuel* means nuclear material that has been made into units which as such or together with supporting structures can be used to produce a chain reaction, based on nuclear fission at a nuclear facility, and insofar as is determined by the Ministry of Trade and Industry, other nuclear material applicable to the production of nuclear energy;
(7) *spent nuclear fuel* means nuclear material that has been used as nuclear fuel for the production of nuclear energy and that contains significant amounts of nuclear waste; (473/1996**)**
(8) *nuclear commodity* means nuclear materials and materials, devices, equipment, information and agreements referred to in paragraphs 4 and 5 of section 2(1) of the Nuclear Energy Act (990/1987); (1069/1999)
(9) *exports* means exports to another State from or through Finnish territory. (1069/1999)
(10) *a manufacturer of nuclear pressure equipment* means a company that manufactures nuclear pressure equipment or carries out the installation, repair or modification of this pressure equipment.

(1069/1999)
The Ministry of Trade and Industry keeps a record if necessary of the particular safeguards obligations referred to in paragraph 5 of subsection 1. (473/1996)

Section 2

As referred to in paragraph 3 of section 2(1) of the Nuclear Energy Act:

(1) ores containing uranium or thorium shall mean minerals in which:
(a) the average content of uranium is higher than 1 kilogram per metric tonne; or
(b) the average content of thorium is higher than 30 kilograms per metric tonne, except for monazite, or higher than 100 kilograms per metric tonne for monazite; as well as
(2) ore concentrates containing uranium or thorium shall mean materials that have been produced from ores by chemical methods and by physical methods commonly used in the processing of minerals and which due to their composition or impurities are not as such suitable for the manufacture of nuclear fuel or for isotopic enrichment, but whose content of uranium is higher than in 1 kilogram per metric tonne or content of thorium higher than 30 kilograms per metric tonne. (473/1996)

The Ministry of Trade and Industry will issue more detailed regulations on the compounds and mixtures that are applicable to the manufacture of nuclear fuel or to isotopic enrichment, as referred to in subsection 1.

Section 3

As referred to in paragraph 2 of section 3 of the Nuclear Energy Act:

(1) special fissile material means plutonium 239, uranium 233, uranium enriched in isotopes 235 or 233, and materials which contain one or more of the above-mentioned materials; and
(2) source material means uranium which contains the mixture of isotopes occurring in nature or uranium in which the relative quantity of isotope 235 has been reduced, and thorium and any of the above materials in the form of metal, alloy, chemical compound or concentrate.

Nuclear material, as referred to in paragraph 2 of section 3 of the Nuclear Energy Act, shall not include:

(1) special fissile material in which the combined content of uranium and plutonium is less than 0.01 kilogram per one metric tonne;
(2) source material in which the combined content of uranium and thorium is less than 0.5 kilogram per one metric tonne; or
(3) ore or ore concentrate referred to above in section 2.

Section 4

The provisions given in the Nuclear Energy Act and in this decree on both nuclear material and nuclear waste are applied to spent nuclear fuel. In addition, the provisions on materials and equipment referred to in section 8 can also be applied.

Otherwise, if, by virtue of the provisions given in the Nuclear Energy Act or in this decree, a material or an object is at the same time more than one of the following: nuclear material, nuclear waste. ore or ore concentrate containing uranium or thorium, or material, device or equipment referred to in section 8, the respective provisions in the Nuclear Energy Act and in this decree are applied to that material or

object separately.

Section 5 (278/1993)

Nuclear waste as referred to paragraph 3 of section 3 of the Nuclear Energy Act, shall not include:

(1) radioactive materials that have spread into the environment along with emissions that result from the use of nuclear energy and that do not exceed the limits set for emissions;
(2) a radioactive material or product which has been manufactured or used for commercial, industrial, agricultural, medical, scientific or educational operations or for other comparable operations (which are not part of nuclear waste management; or
(3) samples taken at a nuclear facility in Finland or from nuclear waste generated in Finland for research purposes in Finland. (473/1996)

Section 6

Extensive disposal of nuclear waste, as referred to paragraph 5 of section 3 of the Nuclear Energy Act, means disposal if it is intended that the disposal facility should contain an amount of nuclear waste in which the total activity of radioactive materials, excluding natural uranium, thorium and depleted uranium, is higher than 1 TBq or the alpha activity is higher than 10 GBq.

The extensive manufacture, production, use, handling or storage of nuclear materials or nuclear waste, as referred to paragraph 5 of section 3 of the Nuclear Energy Act, means these activities if it is intended that the facility used for these purposes should at a given moment contain:

(1) more than 1 effective kilogram of nuclear materials; or
(2) an amount of nuclear waste in which the total activity or alpha activity of radioactive materials exceeds the limits set forth in subsection 1.

Section 7

A nuclear facility of considerable general significance, as referred to in paragraph 3 of section 11(2) of the Nuclear Energy Act, means a nuclear facility in which nuclear materials or waste are fabricated, produced, used, handled or stored to the extent that the amount of nuclear materials at a given moment is more than 50 effective kilograms or the amount of nuclear waste is such that its total activity is higher than 100,000 TBq or the alpha activity higher than 1000 TBq.

A vehicle or a temporary storage directly associated with transport is, however, not considered a nuclear facility.

Section 7 a (473/1996)

In cases referred to in paragraph 1 of section 6 b(2) of the Nuclear Energy Act, the returning to their sender of some minor amounts of nuclear waste into which research has been made is not justified on grounds of safety or due to a significant economic or other weighty reason.

Nuclear waste of unknown origin, as referred to in paragraph 2 of section 6 b(2) of the Nuclear Energy Act, is nuclear waste belonging to the State and for which no owner or holder is found.

Section 7 b (1224/1996)

In cases referred to in paragraph 1 of section 6 a(2) of the Nuclear Energy Act, to meet a safety obligation as per section 6 of the Act or to meet a waste management obligation as per section 9(3), nuclear waste is or has been delivered abroad for research purposes, or nuclear waste is or has been delivered abroad for research purposes to implement measures to prevent nuclear proliferation.

In cases referred to in subsection 1 above, the amount of nuclear waste shall be equal to the amount of nuclear waste required in the research method used. The amount of waste delivered for research purposes shall be so small that it does not significantly affect the waste management obligation of the licensee with a waste management obligation.

In cases referred to in paragraph 2 of section 6 a(2) of the Nuclear Energy Act, the handling, storage and disposal in a manner meant to be permanent of spent nuclear fuel arising from a research reactor operated in Finland, in countries outside Finland is justified on grounds of safety or due to a significant economic or some other weighty reason.

Chapter 2 **- On the scope of application of the Nuclear Energy Act**

Section 8 (473/1996)

Paragraph 4 of section 2(1) of the Nuclear Energy Act refers to:

(1) the possession, fabrication, transfer, export and import of materials to which the Nuclear Energy Act is applied and which are mentioned in paragraph 2.2 of Appendix A to this Decree;
(2) the possession, manufacture, assembly, transfer, export and imports of devices and equipment and their components to which the Nuclear Energy Act is applied and which are mentioned in paragraphs 1.2 and 2.3 of Appendix A; and
(3) the possession, transfer, export and import pf nuclear information to which the Nuclear Energy Act is applied and which are mentioned in paragraphs 1.3 and 2.4 of Appendix A. (430/2004)

The Nuclear Energy Act shall, however, apply to the possession, transfer and import of nuclear information referred to in paragraph 3 of subsection 1 only if particular safeguards obligations are binding on such nuclear information. (430/2004)

The Nuclear Energy Act shall not apply to materials mentioned in point 2.2 of Appendix A, devices and equipment and their components mentioned in point 2.3, and in nuclear information mentioned in point 2.4, if they are exported from another Member State of the European Union to a third Member State through Finnish territory. (430/2004)

The Radiation Act (592/1991) is applied to the prevention and limitation of health hazards and other detrimental effects arising from radiation emitted by the materials, devices and equipment referred to above in subsection 1.

Sections 8 a and 8 b have been repealed.

Section 9 (473/1996)

The agreements mentioned in paragraph 5 of section 2(1) of the Nuclear Energy Act and which can be concluded and implemented only subject to the provisions of the Nuclear Energy Act are agreements the purpose of which is:

(1) to participate outside the territory of the Community or in a State mentioned in point 2.3 of Appendix B to this Decree, in the manufacture, installation, construction or operation of a device or equipment referred to in point 2.3 of Appendix A; or
(2) to participate outside the territory of the Community in the manufacture, installation, construction or operation of a device or equipment mentioned in point 1.2 of Appendix A.

The provisions of subsections 1 shall not apply to contracts of employment.

Section 9 a (430/2004)

Nuclear fuel cycle –related activities referred to in paragraph 6 of section 2(1) of the Nuclear Energy Act, to which the Nuclear Energy Act shall be applied, is development of processes and systems for the following stages of the fuel cycle:

conversion of nuclear material;

enrichment of nuclear material;

fabrication of nuclear fuel;

reactors;

critical facilities;

reprocessing of nuclear fuel; and

processing (not including repackaging or conditioning not involving the separation of elements, for storage or disposal) of intermediate or high-level waste containing plutonium, uranium enriched in the isotope 235 to more than 0.20 (20%) or in the isotope 233..

Research and development activities referred to in paragraph 6 of section 2(1) of the Nuclear Energy Act does not, however, include activities related to theoretical or basic scientific research or to research and development on industrial radioisotope applications, medical, hydrological or agricultural applications, health and environmental effects and improved maintenance.

Section 10

The provisions of the Nuclear Energy Act are not applied to the possession, retransfers, handling, use, storage or transport of nuclear waste which has been transferred by virtue of a licence permitting transfer, if:

(1) the average specific activity of the nuclear waste is lower than 10 kBq/kg;
(2) the total activity of the nuclear waste in the possession of the transferee is lower than 1 GBq and the alpha activity lower than 10 MBq;
(3) it is estimated that the annual effective dose caused by the transferred nuclear waste to any individual cannot exceed 0.01 mSv; and (278/1993)
(4) the radiation exposure caused by the transferred nuclear waste is also otherwise as low as reasonably achievable.

Section 10 a (473/1996)

The provisions of the Nuclear Energy Act shall not apply to the possession, transfer, handling, use, storage, transport, export and import of special fissile material, if the material is part of an instrument for medical purposes and has been placed inside the human body.

Section 10 b (473/1996)

The provisions of the Nuclear Energy Act shall not apply to the possession, transfer, handling, use, storage, transport, export and import of a source material, if:

(1) the material is part of an industrially fabricated device, component or utility article or is part of a device, component or utility article otherwise considered ready for use;
(2) the amount of source material contained in the product is smaller than 4 grams; and
(3) the material is not subject to any particular safeguards obligation.

The Nuclear Energy Act is not applied to the manufacture or production of a product containing source material referred to in subsection 1, provided that no other material subject to the scope of application of the Nuclear Energy Act is used in the manufacture or production of the product.

Chapter 3 **- Use of nuclear energy exempted from a licence**

Section 10 c (430/2004)

When no safeguards obligations are imposed on the nuclear material mentioned in point 2.1 of Appendix A, a licence subject to the Nuclear Energy Act is not needed for importing it from another Member State of the European Union or exporting it to another Member State of the European Union.

A notification shall be sent to the Radiation and Nuclear Safety Authority (STUK) of each export and import referred to in subsection 1 above in compliance with the control system for nuclear material referred to in section 118 below.

Section 11 (473/1996)

If another Member State of the European Union where the exporter is established has granted a licence for the export of nuclear material mentioned in point 2.1 of Appendix A out of the Community, no export licence mentioned in the Nuclear Energy Act is needed to export the nuclear material from Finland, and no import or export licence is required for exports through Finnish territory.

A licence defined in the Nuclear Energy Act is not needed for the import and export of nuclear material mentioned in point 2.1 of Appendix A through Finnish territory from another Member State of the European Union to a third Member State.

Instead of submitting an application for licence referred to above in subsections 1 and 2, a notification referred to in chapter 17 shall be given to the Radiation and Nuclear Safety Authority (STUK).

In cases referred to above in subsections 1 and 2, a licence defined in the Nuclear Energy Act is needed to transport nuclear material, unless the transport has been exempted from licence by virtue of section 17.

Section 22 (473/1996)

The Radiation and Nuclear Safety Authority (STUK) needs no licence referred to in the Nuclear Energy Act for operations performed in its capacity as an authority. The same applies to the International Atomic Energy Agency and the Commission of the European Communities when they carry out the control referred to in section 63 of the Nuclear Energy Act.

Chapter 4 - **The Government decision-in-principle**

Section 23

A nuclear facility project for which the Government's decision-in-principle referred to in section 11 of the Nuclear Energy Act is applied for, can comprise one or more nuclear facilities which for operational or other reasons make up an integrated whole. The application can also concern two or more alternative nuclear facility projects.

The application for a decision in principle shall include at lease the following:
(1) the applicant's name or the firm name used in business operations, and domicile; and
(2) for each nuclear facility:
(a) its planned location;
(b) its intended use; and
(c) the extent of the operations carried out therein or, if the nuclear facility is intended for the generation of nuclear energy, its power range and the planned service life.

Section 24

The application must be supplemented with the following documents:

(1) an official certificate or an extract of the trade register or some other document shoving that the applicant is a Finnish citizen or a Finnish corporation, foundation or a government authority;
(2) if the applicant is a company, a copy of its articles of association, partnership agreement and shareholders' register or, if the applicant is some other corporation or foundation, a copy of its rules;
(3) a description of the expertise available to the applicant
(4) a description of the general significance of the nuclear facility project and its necessity, particularly as concerns Finland's energy supply, and of its significance from the standpoint of the operation and nuclear waste management of other nuclear facilities in Finland.
(5) a description of the applicant's financial resources and the economic viability of the nuclear facility project;
(6) an overall financing plan for the nuclear facility project; and
for each nuclear facility project:
(a) an outline of the technical principles of the planned nuclear facility;
(b) a description of the safety principles that will be observed;
(c) an outline of the ownership and occupation of the site planned for the nuclear facility;
(d) a description of settlement and other activities and town planning arrangements at the planned nuclear facility site and in its immediate vicinity;
(e) an evaluation of the suitability of the planned location for its purpose and the restrictions caused by the nuclear facility on land use in the immediate vicinity;
(f) an assessment report drawn up according to the Act on the environmental impact assessment procedure (468/94) as well as a description on the design criteria that will be observed by the licence-applicant to avoid environmental damage and to restrict the burden on the environment; (25 August, 1994/794)

(g) an outline plan on nuclear fuel management;
(h) an outline of the applicant's plans and the available methods for nuclear waste management; and
(i) any other information considered necessary by the authorities.

If the applicant is a citizen or corporation of the European Union, the application must be supplemented with an explanation of the applicant's nationality and a document equivalent to the descriptions referred to in paragraph 2 of subsection 1. (473/1996)

Section 25

In addition to the specific provisions of the Nuclear Energy Act, the Ministry of Trade and Industry must obtain statements on the application for the decision-in-principle at least from the Ministry of the Interior, the Ministry of Defence, from the State Provincial Office, Regional Council and Regional Environment Centre that have jurisdiction over the municipality of location and the neighbouring municipalities of the planned nuclear facility, and from the advisory committee referred to in section 56(1) of the Nuclear Energy Act. (1069/1999)

In its preliminary safety assessment of the application for a decision-in-principle, the Radiation and Nuclear Safety Authority (STUK) must also include a statement from the advisory committee referred to in section 56(2) of the Nuclear Energy Act.

Section 26

For the decision-in-principle, the Ministry of Trade and Industry shall submit to the Government a special review of the methods of nuclear waste management that are currently applied and planned, their safety, environmental effects, costs and applicability to Finnish conditions.

When the application concerns a nuclear facility intended for the generation of nuclear energy, the Ministry of Trade and Industry must also submit to the Government a special review of the importance of the nuclear facility for Finland's energy supply.

Section 27

The Ministry of Trade and Industry must check that the overall description referred to in section 13(1) of the Nuclear Energy Act and submitted by the applicant to the Ministry has been compiled according to the Ministry's instructions, that the description tallies with the application and that it has been properly compiled in other respects, too.

The Ministry of Trade and Industry must reserve the applicant an opportunity to revise the description following the comments made by the Ministry on the basis of the check mentioned in subsection 1.

Before it is made public, the overall description must be supplemented with a notification in accordance with the instructions of the Ministry of Trade and Industry, showing:

(1) where and when the public can see the application; and
(2) the facts listed below in section 29 or information on how they will be made public.

Section 28

After the Ministry of Trade and Industry has checked the overall description, and at least one month before the public gathering referred to in section 13(2) of the Nuclear Energy Act, the applicant must make the description publicly available in the municipal offices of the municipality of location and the neighbouring municipalities of the planned nuclear facility and to keep the description publicly available in the company head office. In addition, the applicant must distribute the overall description to every household in the municipality of the location of the planned nuclear facility and to other households in the immediate vicinity.

Section 29

The Ministry of Trade and Industry must make it publicly known that a nuclear facility project is pending, and state

(1) where and within which time the overall description published by the applicant is publicly available;
(2) that the residents, municipalities and local authorities in the immediate vicinity of the planned nuclear facility have a chance to present their opinions in writing on the nuclear facility project, and by which time the opinions must be delivered to the Ministry; and
(3) where and when the public gathering referred to in section 13(2) of the Nuclear Energy Act will be arranged.

The notification of the matters mentioned in subsection 1:

(1) must be posted up on the notice boards for public notices of at least the municipality of location and the neighbouring municipalities of the planned nuclear facility for a minimum of one month; and
(2) must be published in the commonly circulated newspapers of the same municipalities not later than one month before the public gathering is arranged.

Section 30

The measures referred to in section 15(2) of the Nuclear Energy Act include:

(1) conclusion of an agreement that is financially binding for the applicant and concerns the delivery or manufacture of the nuclear facility or an essential part, component or structure thereof;
(2) manufacture of the said parts, components or structures by the applicant himself; and
(3) excavation of considerable underground facilities for the nuclear facility.

The measures referred to above in subsection 1 do not, however, include measures which together result only in minor financial losses if the nuclear facility project is not carried out.

Chapter 5 – Licensing

Section 31

A licence to construct a nuclear facility (*construction licence*) is applied for with a written application addressed to the Government. It shall include at least the following information:

(1) the applicant’s name or the firm name used in business operations, and domicile;
(2) the location site of the nuclear facility;

(3) the intended use and operating principle of the nuclear facility;
(4) the quality and extent of the operations carried out at the nuclear facility or, if the nuclear facility is intended for the generation of nuclear energy, its power range and the planned service life;
(5) the timetable of construction, especially the starting time planned for the construction; and
(6) a decision-in-principle concerning the nuclear facility, referred to in chapter 4, when this has been necessary.

Section 32

The application for a construction licence shall be supplemented with the information about the applicant mentioned in paragraphs 1 and 2 of section 24(1) or in section 24(2), and with: (473/1996)

(1) proof of the applicant's right to use the site planned for the nuclear facility;
(2) a description of settlement and other activities and t planning arrangements at the planned nuclear facility site and in its immediate vicinity;
(3) a description of the type of the nuclear facility to be constructed, and the planned suppliers of the essential parts;
(4) a description of the quality and maximum amounts of the nuclear materials or nuclear waste that will be fabricated, produced, handled, used or stored at the nuclear facility;
(5) an outline of the technical operating principles and features and other arrangements which are used to ensure the safety of the nuclear facility;
(6) a description of the safety principles that the applicant intends to observe, and an evaluation of the fulfilment of the principles;
(7) a description of the effects of the nuclear facility on the environment and a description of the design criteria that will be observed by the applicant to avoid environmental damage and to restrict the burden on the environment;
(8) an outline of the operating organisation planned for the nuclear facility;
(9) a description of the applicant's plans for arranging nuclear fuel management;
(10) a description of the applicant's plans and available methods for arranging nuclear waste management, including the decommissioning of the nuclear facility and the disposal of nuclear waste, and a description of the timetable of nuclear waste management and its estimated costs;
(11) a description of the economic viability of the nuclear facility project and its other financial prerequisites;
(12) the cost estimate and financing plan of the nuclear facility project;
(13) the applicant's financial statements for the last five years;
(14) a description of the expertise available to the applicant and the organisation implementing the construction project; and
(15) any other description considered necessary by the authorities.

Section 33

A licence to operate a nuclear facility (*operating licence*) is applied for with a written application addressed to the Government. It shall include at least the following information:

(1) the applicant's name or the firm name used in business operations, and domicile;
(2) the location site of the nuclear facility;
(3) the intended use of the nuclear facility;
(4) the quality and extent of the operations carried out at the nuclear facility or, if the nuclear facility is intended for the generation of nuclear energy, its rated power and the planned service life; and
(5) the construction licence or previous operating licence of the nuclear facility.

Section 34

The application for an operating licence shall be supplemented with the information about the applicant mentioned in paragraphs 1 and 2 of section 24 or in subsection 2, and with: (473/1996)

(1) a description of settlement and other activities and town planning arrangements at the planned nuclear facility site and in its immediate vicinity;
(2) a description of the quality and maximum amounts of the nuclear materials or nuclear waste that will be fabricated, produced, handled, used or stored at the nuclear facility;
(3) an outline of the technical operating principles and features and other arrangements whereby safety has been ensured
(4) a description of the safety principles that have been observed, and an evaluation of the fulfilment of the principle;
(5) a description of the measures to restrict the burden caused by the nuclear facility on the environment;
(6) a description of the expertise available to the applicant and the operating organisation of the nuclear facility;
(7) a description of the applicant's plans and available methods for arranging nuclear waste management, including the decommissioning of the nuclear facility and the disposal of nuclear waste, and a description of the timetable of nuclear waste management and its estimated costs;
(8) a description of the applicant's financial status, the plan for the administration of the finances of the nuclear facility and the production plan of the nuclear facility;
(9) the applicant's financial statements for all the years following the years mentioned in paragraph 13 of section 32 or, if the nuclear facility has previously been granted an operating licence, the financial statements for the year when the previous operating licence vas applied for and any subsequent years;
(10) a description of how the provisions in the construction licence have been complied with or, if the nuclear facility has previously been granted an operating licence, how the provisions in the previous operating licence have been complied with; and
(11) any other information considered necessary by the authorities.

Section 35

When applying for a construction licence, the applicant must submit to the Radiation and Nuclear Safety Authority (STUK)

(1) the preliminary safety analysis report which shall include the general design and safety principles of the nuclear facility, a detailed description of the site and the nuclear facility, a description of the operation of the facility, a description of the behaviour of the facility during accidents, a detailed description of the effects that the operation of the facility has on the environment, and any other information considered necessary by the authorities;
(2) a proposal for a classification document, which shows the classification of structures, systems and components important to the safety of the nuclear facility on the basis of their significance with respect to safety;
(3) a description of quality assurance during the construction of the nuclear facility, showing the systematic measures that are applied by the organisations that take part in the design and construction of the nuclear facility in their operations affecting quality;
(4) plans for physical protection and emergencies;
(5) a plan for arranging the safeguards control that is necessary to prevent the proliferation of nuclear weapons; and

(6) a description of the arrangements referred to in section 19, paragraph 7 of the Nuclear Energy Act.

The applicant for a licence shall also submit to the Radiation and Nuclear Safety Authority any other reports STUK considers necessary. (278/1993)

Section 36

When applying for an operating licence, the applicant must submit to the Radiation and Nuclear Safety Authority (STUK):

(1) the final safety analysis report;
(2) a probabilistic safety analysis;
(3) a quality assurance programme for the operation of the nuclear facility;
(4) the Technical Specifications, which shall at least define limits for the process quantities that affect the safety of the facility in various operating states, provide regulations on operating restrictions that result from component-failures, and set forth requirements for the testing of components important to safety;
(5) a summary programme for periodic inspections;
(6) a description of the arrangements for physical protection and emergencies;
(7) a description on how to arrange the safeguards that are necessary to prevent the proliferation of nuclear weapons;
(8) administrative rules for the nuclear facility; and
(9) a programme for radiation monitoring in the environment of the nuclear facility.

When the application for an operating licence is made for a nuclear facility that has already been in operation, the documents mentioned in subsection 1 need be submitted to STUK only to the extent that they have not been submitted before.

In addition, the applicant must submit to STUK any other information considered necessary by the Radiation and Nuclear Safety Authority.

The statements on nuclear facility licences given by STUK to the licensing authority must include a review of the documents mentioned in section 35 and in subsection 1 of this section.

Section 37

In addition to what is specifically laid down in the Nuclear Energy Act, the Ministry of Trade and Industry must obtain statements on applications for construction and operating licences at least from the Ministry of the Interior, from the State Provincial Office and Regional Environment Centre that have jurisdiction over the municipality of location and the neighbouring municipalities of the nuclear facility, and from the advisory committee referred to in section 56(1) of the Nuclear Energy Act. The Ministry must also obtain a statement on the application for a construction licence from the Ministry of Social Affairs and Health. (1069/1999)

If the application concerns the construction of a nuclear facility other than those referred to in section 11 of the Nuclear Energy Act, the Ministry of Trade and Industry must obtain a statement from the municipality of location of the nuclear facility.

The Radiation and Nuclear Safety Authority (STUK) must obtain a statement on the descriptions mentioned in paragraph 4 of section 35 and in paragraph 6 of section 36(1), from the Ministry of the Interior.

The Radiation and Nuclear Safety Authority (STUK) must supplement its statements on applications for nuclear facilities with a statement from the advisory committee referred to in section 56(2) of the Nuclear Energy Act.

Section 37 a (473/1996)

Before making a decision about the construction licence, the Ministry of Trade and Industry shall ensure that a statement defined in chapter IV of the Euratom Treaty has been obtained about the nuclear facility project and that the applicant has complied with the regulations of chapter IV of the Euratom Treaty and the regulations issued by virtue of it.

Section 38

The decisions on construction and operating licences shall contain at least the following information:

(1) the licensee;
(2) the site where operations can be carried out;
(3) the nature and extent of the operations carried out at the nuclear facility;
(4) the period of validity of the license; and
(5) the licence conditions considered necessary, such as the conditions concerning physical protection and emergency planning, indemnification regarding liability in case of nuclear damage, obligations of Finland's international treaties, protection of the environment, and nuclear waste management.

In particular, the construction licence shall show the structural features, and the operating licence additionally the features of facility operation and other operations carried out at the facility, that the structure and operation of the facility, or the operations carried out therein, must conform with.

The operating licence shall specify the types and amounts of the nuclear materials, nuclear waste and the materials, devices and equipment referred to in paragraph 4 of section 2(1) of the Nuclear Energy Act that are needed in the operation of the nuclear facility and that can be possessed, fabricated, produced, handled, used or stored at the nuclear facility by virtue of the licence for the nuclear facility, without a separate licence defined in chapter 6 of this decree.

Section 39

A notification of the granting of construction and operating licences for nuclear facilities shall be sent to the Radiation and Nuclear Safety Authority (STUK), the Ministry of the Interior, the Ministry of the Environment, the State Provincial Offices and Regional Environment Centres of the relevant counties and to the municipality of location of the nuclear facility. (1069/1999)

After receiving the notification, the State Provincial Office must further give a notification of the granting of a licence to other municipalities concerned and to the relevant water, environment, health, building, labour protection, fire and rescue, and police authorities.

Section 40

In applying for an amendment to the construction licence or operating licence of a nuclear facility, the same regulations shall be observed as in the case of a new licence, to the extent applicable.

Chapter 6 - **Licences for nuclear materials, nuclear waste and for materials, devices and equipment referred to in paragraph 4 of section 2(1) of the Nuclear Energy Act**

Section 41 (473/1996)

Excluding the cases referred to in section 20, the Radiation and Nuclear Safety Authority (STUK) grants a licence for the possession, manufacture, production, handling, use and storage of nuclear materials and nuclear waste (licence for operations), for the transfer of nuclear materials or nuclear waste, and for the possession and transfer of materials, devices or equipment referred to in section 8(1).

Section 42

The application for a licence for operations shall contain at least the following information:

(1) the applicant's name or the firm name used in business operations, and domicile;
(2) the operations for which the licence is applied for;
(3) the site where the operations are intended to be carried out;
(4) the extent of the intended operations;
(5) the timetable of operations, especially the starting time planned for the operations and their duration;
(6) the quantity and quality of any other nuclear materials possibly possessed by the applicant; and
(7) the licences granted to the applicant in accordance with the Nuclear Energy Act, and the supervisors in charge approved for the various operations.

Section 43 (473/1996)

The application for a licence for operations must be supplemented with an official certificate or an extract of the trade register or some other equivalent document about the applicant or about his nationality and also, unless when obviously unnecessary because of the nature of the planned operations, with:

(1) documents equivalent to the documents referred to in section 36;
(2) a description of the organisations planning and implementing the operations;
(3) proof of the applicant's right to use the site or areas required by the operations;
(4) a description of the settlement and other activities and town planning arrangements at the site of the operations and in its immediate vicinity;
(5) a description of the environmental impact of the operations and a description of the design criteria that will be observed by the applicant to avoid environmental damage and to restrict the burden on the environment;
(6) a description of the applicant's plans and available methods for arranging the management of nuclear waste resulting from the operations, including the disposal of nuclear waste, and a description of the timetable of nuclear waste management and its estimated costs;
(7) a description of the types and amounts of nuclear materials and nuclear waste that the operations have been planned to involve; and

(8) any other information considered necessary by the authorities.

Section 44

The Radiation and Nuclear Safety Authority (STUK) must obtain statements on the application for a licence for operations from the Ministry of the Environment and from the advisory committee referred to in section 56(2) of the Nuclear Energy Act, unless obviously unnecessary.

Section 45

The provisions of section 38 shall also apply to the contents of a decision on a licence for operations, to the extent applicable.

A notification of the granting of a licence must be sent at least to the administrative board of the relevant county and to the municipality where the operations referred to in the licence take place.

Section 46

An application concerning the possession of the materials, devices or equipment referred to in paragraph 4 of section 2(1), of the Nuclear Energy Act shall include at least the following information:

(1) the applicant's name or the firm name used in business operations, and domicile;
(2) the operations that involve the possession of the materials, devices or equipment;
(3) is the licence application made for the possession of materials, devices or equipment fabricated by the applicant himself or are they received from some other person;
(4) the quality, quantity and origin of the materials, device or equipment referred to in the application;
(5) from whom and when will the materials, devices or equipment be received, or the timetable for their manufacture;
(6) the place where the materials, devices or equipment will as a rule be kept and used or fabricated; and
(7) the licences granted to the applicant in accordance with the Nuclear Energy Act.
The application must be supplemented with an official certificate or an extract of the trade register or an equivalent description of the applicant or his nationality. (473/1996)

Section 47

The decision on a licence concerning the possession of the materials, devices or equipment referred to in paragraph 4 of section 2(1) of the Nuclear Energy Act shall at least specify:

(1) the licensee;
(2) the types and amounts of materials, devices or equipment covered by the licence;
(3) the validity of the licence; and
(4) the licence conditions considered necessary.

Section 48

An application concerning the transfer of nuclear materials, nuclear waste or the materials, devices or equipment referred to in paragraph 4 of section 2(1) of the Nuclear Energy Act shall include at least the following information:

(1) the applicant's name or the firm name used in business operations, and domicile;
(2) the licence for operations or the construction or operating licence for a nuclear facility or the licence referred to in section 46 by virtue of which the applicant possesses the material, waste, device or equipment that is to be transferred;
(3) the transferee's name or the firm name used in business operations, and domicile;
(4) the types and amounts of materials, waste, devices or equipment covered by the application, and particular safeguards obligation that the material or waste is subject to;
(5) from where and to where it is intended that the materials, waste, devices or equipment be transferred; and
(6) the date planned for the transfer.

The application must be supplemented with the descriptions of the applicant mentioned in paragraphs 1 and 2 of section 24 and with:

(1) an account of the transferee's willingness to accept the transfer and if so required by the Nuclear Energy Act, a description of the licence referred to in paragraph 2 of subsection 1 that has been granted to the transferee, or a description of the application for such licence,
(2) if the application concerns the transfer of nuclear waste, a description of how the transfer is related to the nuclear waste management plan, referred to in section 74, that the applicant has most recently submitted to the authorities; and
(3) any other information considered necessary by the authorities.

Section 49

The decision on a licence concerning the transfer of nuclear materials, nuclear waste or the materials, devices or equipment referred to in paragraph 4 of section 2(1) of the Nuclear Energy Act shall include at least the following information:

(1) the licensee;
(2) the transfer allowed by the licence;
(3) the period of validity of the licence; and
(4) the licence conditions considered necessary.

Chapter 7 - **Intra-Community trade licence** (473/1996)

Section 50 (473/1996)

The Radiation and Nuclear Safety Authority (STUK) grants a licence to import from and export to the Community nuclear materials mentioned in point 2.1, materials mentioned in point 2.2, devices and equipment mentioned in point 2.3 of Appendix A, as well as ores and ore concentrates containing uranium and thorium. A licence for import and export operations (an intra-Community trade licence) is granted for the holder of the construction licence mentioned in section 31 above, the operations licence mentioned in section 33 and the licence for operations mentioned in section 41 as well as the licence for the mining and ore enrichment operations mentioned in section 61.

An intra-Community trade licence covers the export of information mentioned in point 2.4 of Appendix A pertaining to the nuclear materials, other materials, devices and equipment mentioned in subsection 1.

An intra-Community trade licence does not cover the import and export of nuclear materials, other materials, devices, equipment, information, ores or ore concentrates exported into the Community

The provisions of section 53 b, section 53 d(1), sections 54 b and 54 c as well as section 54 d(1) shall be applied as appropriate to the contents of the application for a licence referred to above in subsection 1, to the application procedure and to the contents of the licence.

Section 54 f (473/1996)

If the nuclear material mentioned in point 2.1, the material mentioned in point 2.2, the device or equipment mentioned in point 2.3 of Appendix A or ore or ore concentrate containing uranium or thorium are intended to be exported through Finnish territory out of the Community, or the above mentioned material or product to be imported into the Community is intended to be exported through Finnish territory to another Member State of the European Union, the licence for import is granted at the same time with the licence for export. The licence is granted by the authority mentioned in section 54 d(1).

A licence is not needed, however, if a licence to export out of the Community has been granted by a Member State of the European Union in which the exporter is established.

As regards the contents of the licence referred to above in subsection 1, the provisions of section 53 b, section 53 d(1), sections 54 b and 54 c as well as section 54 d(1) about the contents of the application for the licence, the application procedure and the contents of the licence shall be applied as appropriate.

Chapter 7 c - **Import and export of nuclear waste** (473/1996)

Section 55 (473/1996)

A licence for the import and export of nuclear waste is granted by the Radiation and Nuclear Safety Authority (STUK), with the exception of the cases mentioned in subsection 2.

A licence for the import and export of nuclear waste is granted by the Ministry of Trade and Industry if the provisions pertaining to nuclear materials of the Nuclear Energy Act and of this Decree are applied to nuclear waste at the same time and in the manner laid down in section 4 and if the granting of a licence for the import and export of nuclear materials is vested with the Ministry of Trade and Industry.

Section 55 a (473/1996)

A licence application for the import and export of nuclear waste shall be submitted to the Radiation and Nuclear Safety Authority (STUK). If it is laid down in section 55(2) that a licence is to be granted by the Ministry of Trade and Industry, STUK shall assign the matter to the Ministry of Trade and Industry. At the same time STUK shall deliver to the Ministry its statement on the matter.

Section 55 b (473/1996)

Before a decision is made on a licence for import or, if the Ministry of Trade and Industry is the authority granting the licence, prior to issuing its statement to the Ministry, the Radiation and Nuclear Safety Authority (STUK) shall ensure that the import of nuclear waste meets the requirements of section 7 a and the requirements of the Council Directive (92/3/Euratom) on the supervision and control of shipments of radioactive waste between Member States and into and out of the Community referred to in section 21 of the Nuclear Energy Act.

Before a decision is made on the licence to export nuclear waste or, if the Ministry of Trade and Industry is the authority granting the licence, prior to issuing the statement to be given to the Ministry, STUK shall ensure that the export of nuclear waste meets the requirements of the Directive mentioned in subsection 1.

The statement given by STUK referred to above in section 55 a shall include information about the ensuring mentioned in subsections 1 and 2.

Section 55 c (473/1996)

A licence to import and export nuclear waste can be granted for a period of three years at most at a time.

Section 55 d (473/1996)

The application for an import licence shall contain the information and conditions required in the transfer licence application form defined in article 4 of the Council Directive mentioned in section 55 b(1).

The application for an export licence shall contain the information required in the transfer licence application form defined in article 4 of the Council Directive mentioned in section 55 b(1).

It shall also be indicated in the application for an export licence that the case in question is referred to in section 7 b(1) or (3).

Section 55 e (473/1996)

The decision on an import licence shall contain at least the information and conditions required in the transfer licence application form defined in article 4 of the Council Directive referred to in section 55 b(1) and, in case Finland is a State responsible for the licensing procedure as per the Directive, the information and conditions required in the notification of approval issued by the competent authorities of the parties as per article 6 and in the transfer licence form as per article 7.

The decision on an import licence shall also contain a description of how the waste management obligation pertaining to nuclear waste as per section 9(3) of the Nuclear Energy Act will be fulfilled.

The decision on an import licence shall contain at least the information and conditions required in the transfer licence application form defined in article 4 of the Council Directive referred to in section 55 b(1), in the notification of approval issued by the competent authorities of the parties as per article 6 and in the transfer licence form as per article 7.

Chapter 8 - **Transport licences**

Section 56

A licence for the transportation of nuclear materials and nuclear waste in Finland or through Finnish territory is granted by the Radiation and Nuclear Safety Authority (STUK). (473/1996)

Subsection 2 has been repealed.

Section 72

The application shall be supplemented with an extract from the population register and an extract of the trade register, or an equivalent description of the applicant and his nationality. (473/1996)

(1) a description of the transferor or transferee of information; and
(2) any other information considered necessary by the authorities.

In addition to what is said in subsection 1, the application concerning an agreement must be supplemented with:

(1) a description of the other party to the agreement;
(2) the name of the country where the agreement will be executed;
(3) a description of the project as a whole, how the applicant intends to participate in the implementation of the project, and any other participants in the implementation; and
(3) any other information considered necessary by the authorities.

If the application concerns an agreement referred to in section 71(2), the application must be supplemented with a certified copy of the agreement. The descriptions mentioned above in paragraphs 1 to 3 of subsection 3 need be attached to the application only to the extent that they are not included in the agreement. If the licence has been granted before the conclusion of the agreement, a copy of the agreement must be sent to the Ministry of Trade and Industry immediately after its conclusion.

Section 73

A licence for the possession or transfer of information is granted by a decision which shall contain at least the following information:

(1) regulations that restrict the copying of the information that is subject to licence;
(2) regulations concerning secrecy; and
(3) any other licence conditions considered necessary.

A licence for the conclusion and execution of an agreement is granted by a decision which shall contain at least the following information:

(1) the countries within which the civil agreement can be executed;
(2) the conditions which must be observed in concluding the agreement;
(3) and other licence conditions considered necessary.

Chapter 12 - **Nuclear waste management**

Section 74

To fulfil the intent laid down in section 28 of the Nuclear Energy Act, a licensee with a waste management obligation shall each calendar year, by the end of September, submit the following plans and reports on his nuclear waste management measures to the authority referred to in the said section:

(1) a plan on how the licensee with a waste management obligation has- planned to carry out the nuclear waste management measures and their preparation; the plan shall include at least the

following parts:
(a) an overall plan for carrying out the licensee's entire nuclear waste management obligation, with the relevant timetables and specifications, including the necessary preparations and research and the administrative arrangements and other duties required by the waste management obligation;
(b) a detailed plan on the measures that the licensee intends to undertake during the next calendar year; and
(c) an outline plan for the measures that the licensee plans to undertake in the course of the next five years;
(2) a description of the agreements and other arrangements that the licensee has made to arrange nuclear waste management; and
(4) any other information considered necessary by the authorities.

The authority mentioned in section 28 of the Nuclear Energy Act can require that the licensee draw up a plan on the matters referred to above in paragraph 1 of subsection 1 at other times, too, when this is deemed necessary. If some significant changes take place in nuclear waste management, the licensee must notify the said authority thereof without delay.

Section 75

When the nuclear waste management obligation includes the decommissioning of a nuclear facility or the cessation of mining or enrichment operations, the nuclear waste management plan submitted by the licensee in accordance with section 74 shall contain the following information:
(1) the method and timetable of the decommissioning or cessation of operations;
(2) storage of the nuclear waste resulting from the decommissioning or cessation of operations before disposal, and a description of the disposal; and
(3) any other information considered necessary by the authorities.

Section 76

When a decision is made on the principles that form the basis for the waste management obligation, the decision must be based on the premise that the nuclear waste can be transferred beyond Finland's jurisdiction for good or that it can be placed into Finnish ground or bedrock. The transfer beyond Finland's jurisdiction can be accepted if there exists a binding agreement on the transfer and this agreement can be considered viable from the paragraph of view of nuclear waste management, taking account of the timetable of its execution and other conditions. The decision must set a deadline for the nuclear waste management measures to be taken.

Section 77

In addition, the licensee with a waste management obligation shall each calendar year, by the end of March, submit a report to the authority referred to in section 28 of the Nuclear Energy Act on the measures he has completed.

Section 78

The Ministry of Trade and Industry must obtain a statement from the Radiation and Nuclear Safety Authority (STUK) on the plans and reports described in sections 74 and 75.

Section 79

The authority mentioned in section 28 of the Nuclear Energy Act can exempt a licensee with a waste management obligation from submitting the plans and reports referred to above in section 74(1), and section 77 each calendar year if they are not required by the control of nuclear waste management.

Section 80

Before giving the order referred to in section 29 of the Nuclear Energy Act, the Ministry of Trade and Industry must obtain a statement from the Radiation and Nuclear Safety Authority (STUK) on the effect of mandatory waste management co-operation on the safety of nuclear waste management.

Before giving the order referred to in subsection 1 above, the Ministry of Trade and Industry must hear the parties of the waste management co-operation, unless the giving of the order is based on their application.

The decision of the Ministry of Trade and Industry in which various licensees with waste management obligations are ordered to undertake waste management measures jointly must contain at least the following information:

(1) what nuclear waste and waste management measures are included in the co-operation and how is it to be arranged;
(2) distribution of the costs incurred by the nuclear waste management between the licensees; and
(3) when will the joint nuclear waste management expire.

Section 81

An application for the transfer of waste management obligation, as referred to in section 30 of the Nuclear Energy Act, must be submitted to the Ministry of Trade and Industry for decision together with the application for the transfer of a nuclear facility, a mine or enrichment plant intended for the production of uranium or thorium, or nuclear waste to another party.

The application must be made jointly by the transferor and the transferee.

Section 82

In applying for the licences referred to in section 81, the licensee with a waste management obligation must show how the financial provision as per chapter 7 of the Nuclear Energy Act will be arranged with respect to the management obligation that is transferred to the transferee, and present plans on how the management of the nuclear waste that is transferred to the transferee will be carried out in accordance with the provisions of the Nuclear Energy Act and this decree.

The decisions on the applications referred to above in section 81(1) shall be given at the same time.

Section 83

The decision referred to in section 30 of the Nuclear Energy Act must contain a condition stating that the decision will not become effective unless financial provision for the cost of nuclear waste management has been arranged in the way described in chapter 7 of the Nuclear Energy Act.

Section 84

A licensee with a waste management obligation must apply for an order, referred to in section 32 of the Nuclear Energy Act, on the expiry of his waste management obligation after the measures mentioned in the said section have been completed.

If the decision on the waste management obligation is given by the Ministry of Trade and Industry, the Radiation and Nuclear Safety Authority (STUK) must, on request, give a certificate of the completion of disposal for the application referred to in subsection 1.

The application can be submitted at the same time as the application for the transfer of waste management obligation.

Section 85

The Radiation and Nuclear Safety Authority (STUK) must report the disposal site of nuclear waste and the prohibition on measures, referred to in paragraph 6 of section 63(1) of the Nuclear Energy Act, so that they can be entered in the real estate register, land register or list of titles.

Chapter 13 - **Financial provision for the cost of nuclear waste management**

Section 86

The provision by the licensee with a waste management obligation shall be founded on a waste management scheme and on the calculations of waste management costs which are based on that scheme. The licensee with a waste management obligation shall draw up a proposal for the waste management scheme and for the calculation based on it.

Section 87

The waste management scheme shall present all the measures that are called for by waste management and describe them in sufficient detail for the calculation of the assessed liability. The plans described in the scheme must be modified and revised in line with technological and other developments.

Section 88

The licensee with a waste management obligation shall submit the waste management scheme to the Ministry of Trade and Industry for approval for the first time early enough before beginning the operations that produce nuclear waste, and at the latest in connection with the licence application for these operations.

The licensee with a waste management obligation must later annually supplement the approved waste management scheme and the associated calculations and, for the estimation of the assessed liability at the end of the calendar year, the Fund target in the next calendar year, and the assessed liability at the end of the next calendar year, submit the following documents to the Ministry of Trade and Industry each calendar year, by the end of September: the revised and supplemented waste management scheme, information on the costs and prices of waste management measures, information on the amounts of nuclear waste included in the waste management obligation and on the necessary waste management measures, and the resultant calculation of the total costs of nuclear waste management at the above-mentioned times.

For the confirmation of the assessed liability as at the end of the previous calendar year and the Fund target for the current year, the licensee with a waste management obligation must supplement the reports laid down in subsection 2 with the final data for the previous calendar year and submit them to the Ministry of Trade and Industry by 10 January.

Section 89

By the end of January, the Ministry of Trade and Industry shall confirm the licensee's assessed liability as at the end of the previous calendar year and Fund target for the current calendar year and shall make a decision on an estimate on the assessed liability as at the end of the current calendar year.

Section 90

Before approving the waste management scheme referred to in section 86, the Ministry of Trade and Industry must obtain a statement from the Radiation and Nuclear Safety Authority (STUK) on factors relating to the safety of the measures presented in the waste management scheme.

Before confirming the assessed liability referred to in section 43(2) of the Nuclear Energy Act, the Ministry of Trade and Industry must obtain a confirmation from STUK on the amounts of nuclear waste included in the waste management obligation and on the necessary waste management measures, as referred to above in section 88.

Section 91

The licensee with a waste management obligation must submit his proposal for the securities to be supplied by virtue of section 45 of the Nuclear Energy Act to the Ministry of Trade and Industry and make an application to the Government for the approval of the security defined in paragraph 3 of section 45(1) of the Nuclear Energy Act by the end of March.

Section 92

If the proposed security, referred to in paragraph 3 of section 45(1) of the Nuclear Energy Act, is a real estate mortgage, the application for its approval must be supplemented with the following information:

(1) a description of the title to the real estate;
(2) a description of the debts and fees that the real estate is responsible for, including a right of lien on the unpaid purchase price;
(3) an extract from the real estate or land register or from the list of titles;
(4) a map showing the location and buildings of the real estate;
(5) a description of the intended use of the real estate and the town plan of the area;
(6) a reliable estimate of the probable transfer price of the real estate;
(7) a written pledge given by the owner of the real estate; and
(8) any other information required separately.

Section 93

If the proposed security, referred to in paragraph 3 of section 45(1) of the Nuclear Energy Act, is a direct liability guarantee by a Finnish association, the application for its approval must be supplemented with the following information on the guarantor:

(1) an extract from the trade register or a corresponding register extract;
(2) a copy of the articles of association or rules;
(3) a list of shareholders or some other description of the owners of the association;
(4) the financial statements of the association for the last five years;
(5) a written consent to guarantee given by the association; and
(6) any other information required separately.

Section 94

A real estate mortgage that has been confirmed on a nuclear facility property cannot be accepted as a security referred to in paragraph 3 of section 45(1) of the Nuclear Energy Act.

A real estate mortgage that is used as a security cannot exceed three fourths of the probable transfer price of the real estate.

Section 95

By the end of June, the licensee with a waste management obligation shall supply the securities referred to in section 45 of the Nuclear Energy Act to the Finnish State Treasury.

Section 96

The Ministry of Trade and Industry must annually examine the securities referred to in section 45 of the Nuclear Energy Act and estimate whether their security value can still be considered sufficient. If necessary, the Ministry must take the matter to the Government for decision.

If the security can no longer be considered sufficient, the Ministry of Trade and Industry has the right to demand a supplementary security or a new security and to set a deadline by which such security is to be supplied.

Section 97

The Ministry of Trade and Industry has the right to determine the order in which the securities referred to in section 45 of the Nuclear Energy Act are converted into money

If securities are returned to the licensee with a waste management obligation, the Ministry of Trade and Industry has the right, after hearing the licensee, to determine which securities are returned in each case and in which order they are returned.

Section 98 (1069/1999)

The provisions in chapter 7 of the Nuclear Energy Act are not applied to a licensee with a waste management obligation if the Ministry of Trade and Industry estimates that the future costs induced by the management of the nuclear waste that is or will be produced as a result of his operations will be no more than 40,000 euros.

Chapter 14 - **Capital of the National Nuclear Waste-Management Fund**

Sections 99–100 have been repealed.

Section 101

The decision on the granting of the loan referred to in section 52(1) of the Nuclear Energy Act is made by the National Nuclear Waste Management Fund.

If the licensee with a waste management obligation or his shareholder has failed to pay an overdue loan or loan interest to the National Nuclear Waste Management Fund, this licensee or shareholder cannot be granted a loan from the National Nuclear Waste Management Fund until he has paid the overdue loan or interest.

Section 102

Before the National Nuclear Waste Management Fund transfers capital to the State finances pursuant to section 52(2) of the Nuclear Energy Act or lends money to the State pursuant to subsection 3 of the mentioned section, an allocation must be made for the management of the Fund administration. (1224/1996)

In case the National Nuclear Waste Management Fund receives contributions that can be lent to a licensee with a waste management obligation or to a shareholder of the licensee pursuant to subsection 1, the Fund must lend them as soon as possible.

Section 103

In case the National Nuclear Waste Management Fund transfers capital to the State finances, the agreement that is made on the transfer of the capital shall include a provision stating that the State budget can contain an appropriation for the return of the transferred capital back to the Fund before the end of the fixed period if it is necessary for the fulfilment of the obligations set for the Fund in chapter 7 of the Nuclear Energy Act.

Section 104

Each year the Ministry of Trade and Industry must prepare an estimate to the National Nuclear Waste Management Fund of the assessed liabilities and Fund targets of all licensees with waste management obligations for the next six years.

Section 105

The National Nuclear Waste Management Fund must see to it that the security value of the securities referred to in section 52(1) of the Nuclear Energy Act can still be considered sufficient.

If the security can no longer be considered sufficient, the National Nuclear Waste Management Fund has the right to demand a supplementary security or a new security and to set a deadline by which such security is to be supplied.

Section 106

The National Nuclear Waste Management Fund has the right to determine the order in which the securities referred to in section 52(1) of the Nuclear Energy Act are converted into money.

If securities are returned to the licensee with a waste management obligation or to a shareholder of the licence holder, the Fund has the right, after hearing the debtor, to determine which securities are returned in each case and in which order they are returned.

Section 107

The securities referred to in section 45 and section 52(1) of the Nuclear Energy Act are kept at the Finnish State Treasury. The Treasury must see to it that the securities in its possession are still valid.

Chapter 15 - **Regulatory control**

Section 108

The various phases in the construction of a nuclear facility cannot be commenced until the Radiation and Nuclear Safety Authority (STUK) has, on the basis of the documents mentioned in section 35 and other detailed plans and documents, ascertained for each phase that all safety-related factors and safety regulations have been given sufficient consideration.

Section 109 (1069/1999)

After the construction licence has been granted, the Radiation and Nuclear Safety Authority (STUK) controls the implementation of the facility project in detail. The purpose of the control is to ensure that the conditions of the construction licence and the approved plans referred to in section 35 are complied with and that the nuclear facility is also in other respects constructed in accordance with regulations issued on the basis of the Nuclear Energy Act.

Section 110

The various phases in the commissioning of a nuclear facility cannot be commenced until the Radiation and Nuclear Safety Authority (STUK) has issued the respective decisions required in section 20(2) of the Nuclear Energy Act.

Section 111

The Radiation and Nuclear Safety Authority (STUK) controls the operation of a nuclear facility to ensure that the operation of the facility is safe and complies with the licence conditions and the approved plans and that the operation also in other respects adheres to the Nuclear Energy Act and to the regulations issued by virtue of the Act. The control of the operation of a nuclear facility also involves the maintenance, repairs, inspections and tests of the nuclear facility systems, structures and components.

Section 112

If the licensee intends to carry out modifications in the nuclear facility systems or structures, in nuclear fuel or in the way the facility is operated, and these modifications would have an effect on safety and would involve changes in the plans or documents approved by the Radiation and Nuclear Safety